IN THIS ISSUE

STEEL
The Metalworking Weekly

October 14, 1957
Vol. 141 No. 16

REGULAR FEATURES

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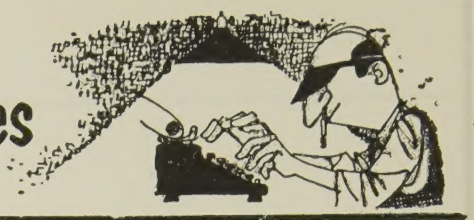
behind the scenes



Past Catches Editor

STEEL's editors turn up at conventions, meetings, industrial forums (there's a plural that must be a sore temptation to our learned and scandalized proofreaders!), and wherever metalworking news is kicked around. It remained, however, for Associate Managing Editor John Morgan to appear on a radio program that originated in the administration building of a college for young females. Indeed, Honest John has a gift for winding up in unusual situations. Immediately following World War II, he took a graduate course at Western Reserve University; claimed he wanted an M.S. degree to go with the B.A. degree conferred on him by Yale, a school somewhere in New England. His schedule was involved (naturally), and he took some courses at Flora Stone Mather College, the women's division of Western Reserve University. A cagey fellow, he had always carefully concealed this part of his checkered past.

On Wednesday evening, Oct. 2, he appeared on a radio program originating in Cleveland, called "Western Reserve University Round Table." The subject under discussion was the President's Small Business Conference, and its was aired nationally from radio station WGAR. John, prepared to give his all for STEEL, nearly fell off his stool when the moderator introduced him as the only man who had ever attended Mather.

The foregoing is necessary, because it explains the telegram John received the next day from STEEL's rascally Chicago representative, Leon C. Pelott. The message, harshly candid, ran: "CONGRATULATIONS UNCLE BULGY. WESTERN RESERVE PROGRAM CAME THROUGH LOUD AND CLEAR, AND YOU'RE A CREDIT TO STEEL AND PENTON. BUT WHAT IN THE H——— WERE YOU DOING AT MATHER?"

Low Gross Wins Pot

Another business representative of STEEL engages our attention this week. Business Manager D. C. Kiefer had been making like a swami for several days, staring intently at a large silver bowl on his desk. A Paul Revere silver creation (any art object costing more than $3 is properly a creation), Kiefer's pot, or bowl, is large enough to contain comfortably an adult agouti, couchant.

"What's with this pot stuff?" we asked him. "How come you keep staring at ———————."

"It isn't a pot," he interrupted coldly. "It's a silver bowl, and I won it fair and square at the Material Handling Institute meeting at White Sulphur Springs, W. Va., back in September."

We asked him how he managed to lift a silver bowl from the MHI boys, and he explained that because he knocked a little white ball 18 times into 18 holes with fewer knocks than anyone else, the institute conferred on him the Order of the Silver Pot —or Bowl, that is.

Make or Buy?

In older pre-ulcer days in pioneer rural sections, our ancestors made what they couldn't buy. As they moved up the social ladder and civilization engulfed them, they bought what they needed. "Makin' stuff," they said, "was for the birds if it could be store-bought." As in any democratic society, this attitude brought about at least two schools of thought: Should we make it, or should we buy it?

STEEL's Program for Management story (Page 105) examines this particular situation insofar as it concerns the metalworking industry. Companies that are equipped to produce the parts they need sometimes find it more practical to buy them, whereas in some instances companies that aren't set up to make their own parts try to convince themselves that they should. STEEL's objective report to management on this really confusing issue is designed to clarify executive thinking. There are so many pertinent considerations to govern an opinion you shouldn't reach a decision until you read the article.

Shrdlu

(Metalworking Outlook—Page 59)

YOLOY "E" IS ON THE JOB

. . . giving greater strength and corrosion-resistance to salt mine cars

These special mine cars operate 1100 feet below ground where repairs and replacements are costly and difficult. Yoloy "E" was chosen for the bodies of these cars because The International Salt Company needs rugged equipment. Equipment that will resist severe corrosion; equipment that is strong and durable but light in weight.

Yoloy "E" steel meets these exacting specifications. Yoloy "E" has a high strength to weight ratio, superior resistance to corrosion, high resistance to shock and fatigue failure, and is easy to weld and fabricate.

Youngstown's complete family of Yoloy steels is available in sheets, plates, bars, shapes, Cold Drawn Bars, and Tubular products. Data sheets on each of the Yoloy family of steels will be sent upon request.

QUALITY YOUNGSTOWN SERVICE

Producers of Carbon, Alloy and Yoloy Steels

THE YOUNGSTOWN SHEET AND TUBE COMPANY
General Offices - Youngstown 1, Ohio
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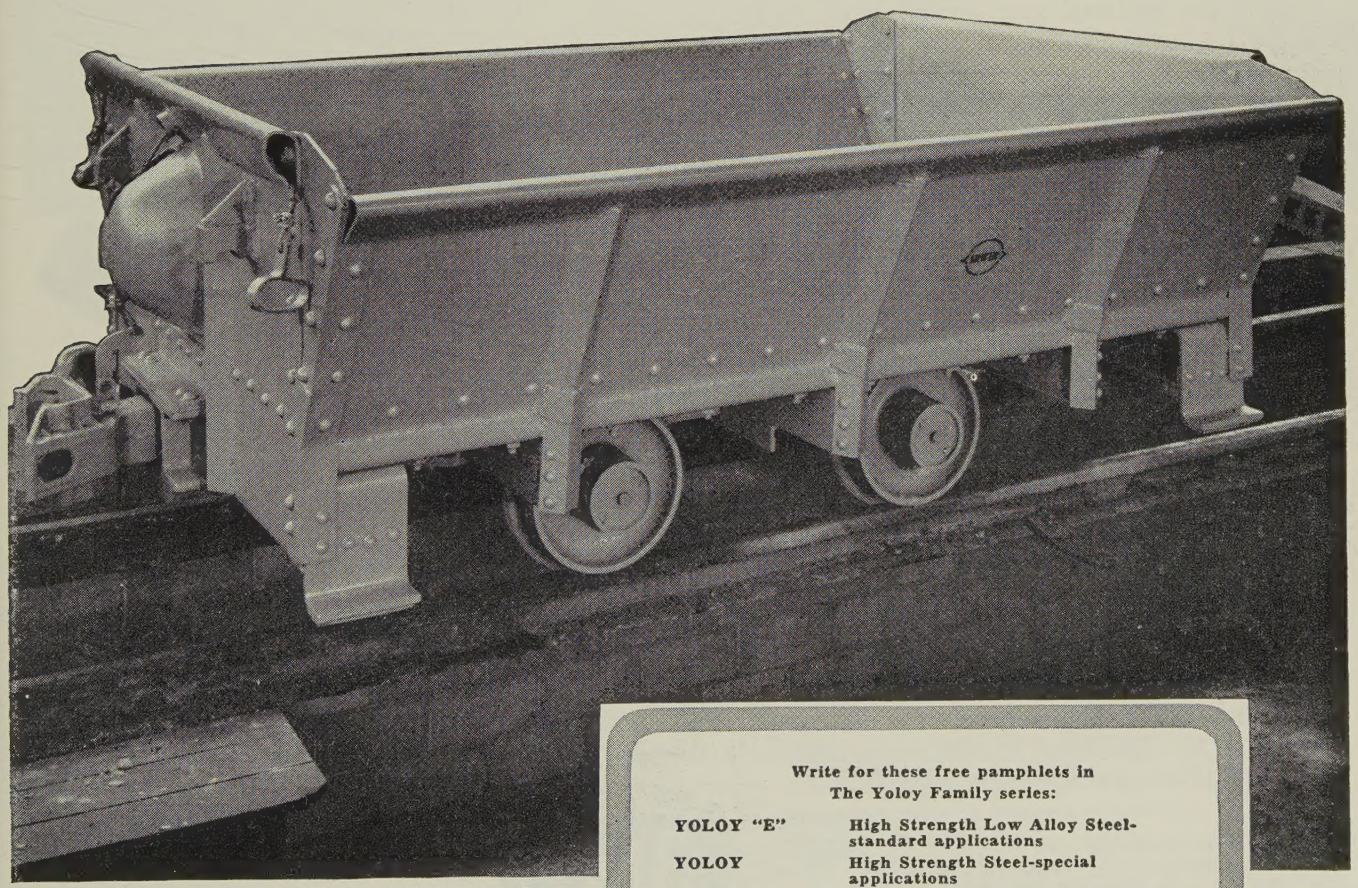


Photograph courtesy of Irwin Foundry and Mine Car Co.

Write for these free pamphlets in The Yoloy Family series:

YOLOY "E"	High Strength Low Alloy Steel-standard applications
YOLOY	High Strength Steel-special applications
YOLOY "S"	Higher Strength Steel for increased service life
YOLOY "C"	Corrosion Resistant Grade for deep forming
YOLOY PIPE	Continuous Weld for corrosion resistant applications

LETTERS
TO THE EDITORS

Editorial To Be Circulated

We would like to circulate reprints of your editorial, "Think for Tomorrow" (Sept. 9, Page 61), to our district and regional managers throughout the country. Please forward 25 copies.

T. K. Russell
Manager, Advertising & Sales Promotion
American Pulley Co.
Philadelphia

STEEL in Great Demand

Please send reprints of the following Program for Management articles: "Dealing with Workers" (Sept. 16, Page 119), "Grooming Middle Managers" (Mar. 18, Page 93), and "Motivating Men To Produce More" (Sept. 24, 1956, Page 105).

I find your publication difficult to retain because it is read by anyone who can get their hands on it.

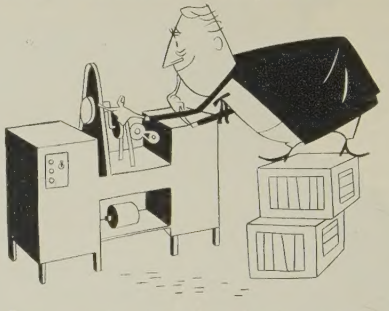
Jerry I. Gould
Planning Engineer, Purchasing
Progressive Machine Co.
Huntington Park, Calif.

Report on Expansion

Please send three copies of the article, "How U. S. Steelmaking Capacity Is Growing." This interesting story begins on Page 79 of the Sept. 16 issue.

H. C. Rossrucker
Statistician
American Iron & Steel Institute
New York

Better Results from Tools



I was quite impressed with your article, "How To Get More from Machine Tools" (Sept. 23 insert). We are making a study of our machine cut time and are trying to obtain better results from our tools. This article seems to fit the bill. Please send six copies.

H. E. Schaeffer
Industrial Engineering Dept.
SKF Industries Inc.
Philadelphia

This interesting article will be of considerable use to our department. Please send three copies.

Thank you for your splendid articles. We look forward to reading your magazine each week.

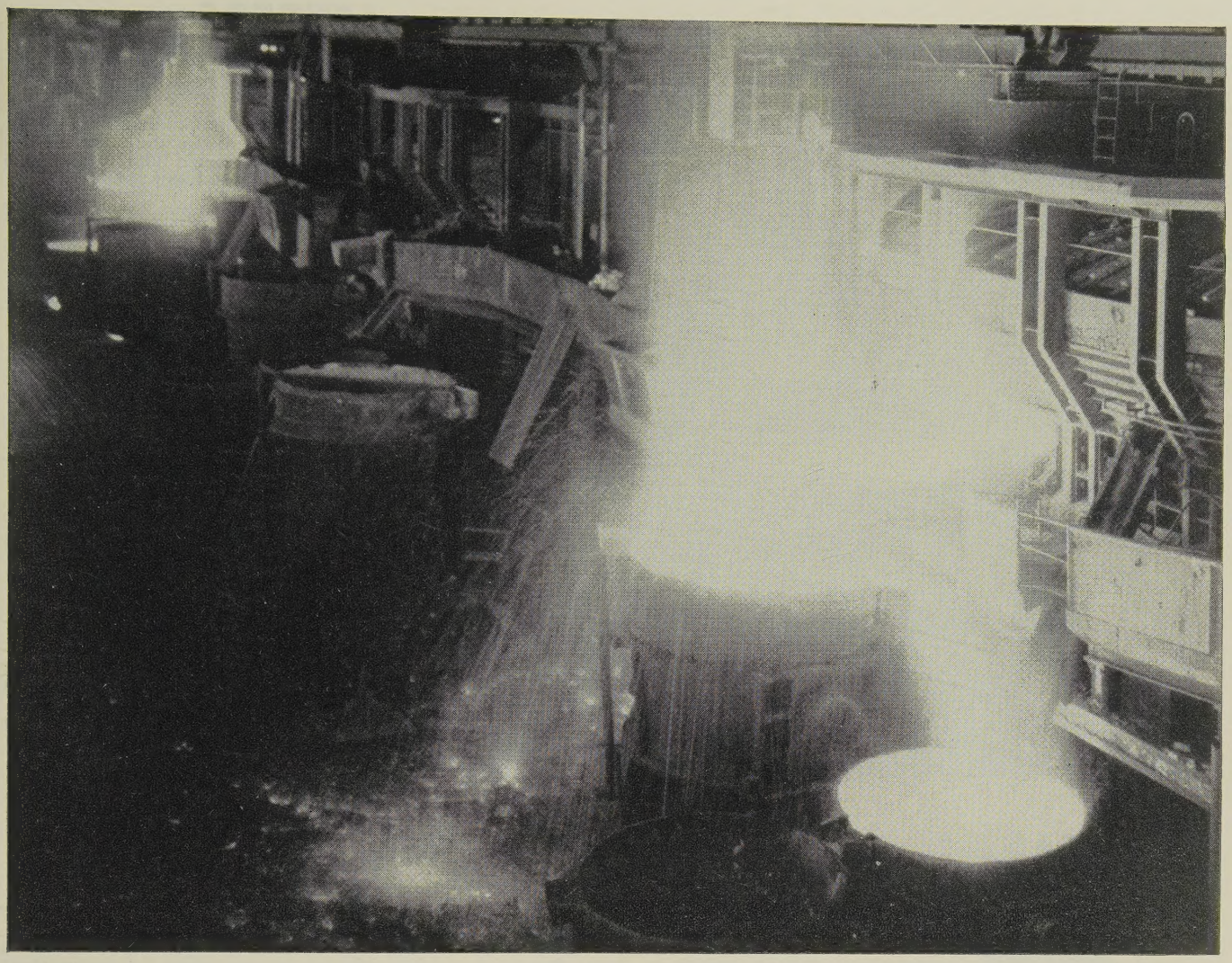
Frank G. Schubert
Chief Industrial Engineer
Ditto Inc.
Chicago

Experimenting with Glass

Your article, "What Glass Can Offer Metal" in the Aug. 19 issue (Page 154), interests us.

You speak of "a special clay, water, and frit to make the slip." If this slip

(Please turn to Page 12)



Increase production of your existing open hearths

We concur with the opinion of many steel plant operators that modernization of existing open hearth facilities represents an economical and often overlooked way to materially boost annual tonnage—with a minimum capital investment.

The required modification of present furnaces to assure a substantial increase in production involves a thorough design study—not only of hearth size or capacity, but also with respect to all other essentials of furnace structure from burners to stack. We have successfully completed a great number of such projects, and will welcome an opportunity to make a complete review of your steelmaking facilities.

From first heat to heat treat, look to **LOFTUS**
Engineering Corporation

1 Gateway Center, Pittsburgh 22, Pa.
140 S. Dearborn St., Chicago 3, Ill.

57.17.7

LETTERS

(Concluded from Page 10)

is not a secret formula, we would appreciate having it and the source of this special clay. I would like to do some experimental work with this process.

Arthur E. Roberts
Technical Training Center
Cincinnati Milling Machine Co.
Cincinnati

• *For further information, write: C. E. Bulloch, Director of Product Development, A. O. Smith Corp., Milwaukee 3, Wis.*

Boron in Stainless Steel

Please send a reprint of the article, "A New Stainless for Atomic Energy" (Sept. 9, Page 104). I found it interesting and informative.

J. S. Huntington
Technical Assistant to
Division Manager, Metals Div.
Utica Drop Forge & Tool
Div. of Kelsey-Hayes Co.
Utica, N. Y.

Finds Chart Valuable

The barrel finishing chart (Page 109) in your story, "Barrel Finishing Made Simpler" (Sept. 9), has been found valuable in our operations.

We would appreciate six copies of the article.

V. L. Brink
Chief Engineer
Linde Co.
Division of Union Carbide Corp.
Newark, N. J.

Interest in Steel Wool

I have read with interest your article, "Steel Wool Sales $24.5 Million" (Aug. 26, Page 103). I would like more information on this industry. Could you refer me to any sources of information?

Howard A. Nusbaum
General Manager
Durall Products Co.
York, Pa.

• *We are forwarding a list of companies which make metal wool.*

Upgrading Ductile Iron

We were interested in the article, "Ductile Iron: How Heat Treatment Upgrades It" (Sept. 16, Page 132). We would appreciate five copies.

Carl F. Joseph
Technical Director
Central Foundry Div.
General Motors Corp.
Saginaw, Mich.

Great Help to Manager

We request that you send two copies of your article, "How To Be a Better Boss" (Sept. 23, Page 90). It was excellent and will be of great help.

J. A. Pruessner
Manager
Building, Equipment & Utility Maintenance
Sandusky Foundry & Machine Co.
Sandusky, Ohio

Reader Appreciates Story

Thank you for sending two reprints of the article, "Case History on Cathodic Protection" (Aug. 12, Page 128). We are glad to see a publication of STEEL's standing include this information.

A. B. Campbell
Executive Secretary
National Association of Corrosion Engineers
Houston

CALENDAR
OF MEETINGS

Oct. 14-16, Truck Body & Equipment Association Inc.: Annual meeting and exhibit, Atlanta-Biltmore Hotel, Atlanta. Association's address: 1616 K St. N. W., Washington 6, D. C. Secretary: Arthur H. Nuesse.

Oct. 14-17, Wire Association: Annual convention and exhibit, LaSalle Hotel, Chicago. Association's address: 453 Main St., Stamford, Conn. Executive secretary: Richard E. Brown.

Oct. 16, American Iron & Steel Institute: Regional technical meeting, South Shore Country Club, Chicago. Institute's address: 150 E. 42nd St., New York 17, N. Y. Secretary: George S. Rose.

Oct. 17-18, Magnesium Association: Annual convention, Biltmore Hotel, New York. Association's address: 122 E. 42nd St., New York 17, N. Y. Executive secretary: Jerry Singleton.

Oct. 17-19, Foundry Equipment Manufacturers Association Inc.: Annual meeting, Greenbrier, White Sulphur Springs, W. Va. Association's address: One Thomas Circle, Washington 5, D. C. Secretary: C. R. Heller.

Oct. 17-20, American Society of Industrial Designers: Annual national convention, Ojai Valley Inn, Ojai, Calif. Society's address: 48 E. 49th St., New York 17, N. Y. Executive secretary: Sally G. Swing.

Oct. 20-23, American Hardware Manufacturers Association: National hardware convention, Marlborough-Blenheim Hotel, Atlantic City, N. J. Association's address: 342 Madison Ave., New York 17, N. Y. Secretary-treasurer: Arthur L. Faubel.

Oct. 20-23, National Association of Sheet Metal Distributors: Annual meeting, Marlborough-Blenheim Hotel, Atlantic City, N. J. Association's address: 1900 Arch St., Philadelphia 3, Pa. Secretary: Thomas A. Fernley Jr.

Oct. 20-23, Scientific Apparatus Makers Association: Midyear meeting of industrial instrument section, Grand Hotel, Point Clear, Ala. Association's address: 20 N. Wacker Dr., Chicago 6, Ill. Executive vice president: Kenneth Andersen.

Oct. 21-23, American Society of Mechanical Engineers: Conference on power, Americus Hotel, Allentown, Pa. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

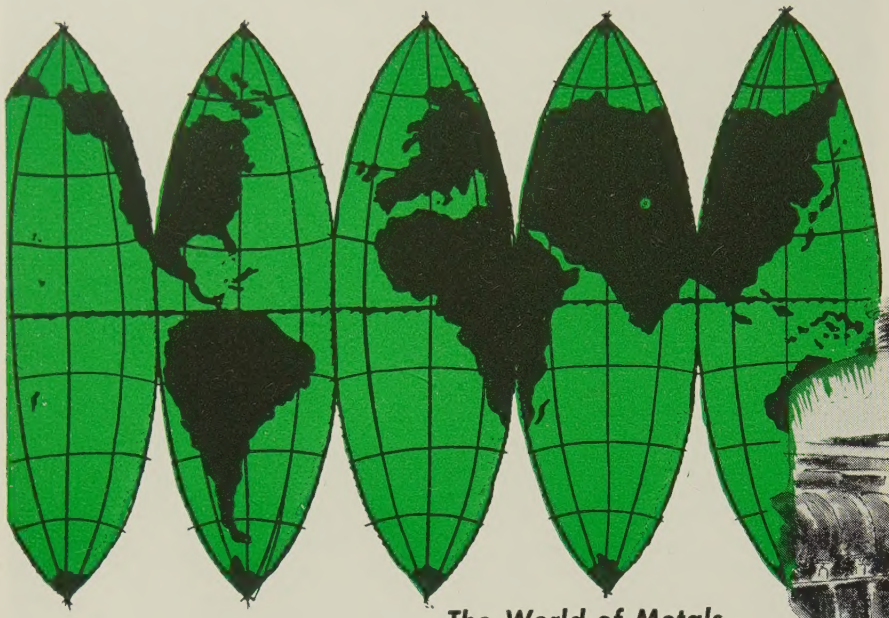
Oct. 21-25, National Safety Congress and Exposition: Conrad Hilton Hotel, Chicago. Sponsor: National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill. Secretary: R. L. Forney.

Oct. 23, American Iron & Steel Institute: Regional technical meeting, Hotel Thomas Jefferson, Birmingham. Institute's address: 150 E. 42nd St., New York 17, N. Y. Secretary: George S. Rose.

Oct. 23-25, National Fluid Power Association: Fall meeting, Hotel Statler, Washington. Association's address: 1618 Orrington Ave., Evanston, Ill. Executive secretary: Barrett Rogers.

Oct. 24-26, National Management Association: Annual meeting, William Penn Hotel, Pittsburgh. Association's address: 321 W. First St., Dayton, Ohio. Secretary: Jean B. Adams.

Oct. 27-30, American Gear Manufacturers Association: Fall meeting, Edgewater Beach Hotel, Chicago. Association's address: One Thomas Circle, Washington 5, D. C. Executive secretary: John C. Sears.



The World of Metals . . . **and the metal men who make it possible — from the United States and 'round the world — will be in Chicago the week of November 4 to attend the**

39th National Metal Exposition
2nd World Metallurgical Congress

Overseas visitors from 38 foreign countries will join 50,000 American metal men in the greatest presentation of ideas and product developments the world has seen . . . at Chicago, the week of November 4.

Scores of scientific and practical sessions on metals — their production, processing, fabrication and application — will be the world forum for noted authorities. Overseas experts, fresh from a series of eight metalworking tours of the United States, will meet with American authorities in Chicago for the exchange of engineering information.

They will see a vast array of metalworking exhibits in the International Amphitheatre and Exposition Hall. More than 500 metalworking firms will display their newest product development, most of them in actual operation. It will be a Metal Show to remember . . . a Metal Show the like of which has never been seen.

This is the world event that has been in the making for four years. This is the world event you and your associates in management, engineering production and sales will want to attend. Mark the date — November 4 to 8. The place — Chicago's International Amphitheatre and Exposition Hall. Plan to be there. For hotel reservations write: Metal Show Housing Bureau, c/o Chicago Convention Bureau, Inc., 134 N. LaSalle Street, Suite 900, Chicago 2, Illinois.

Cooperating Societies: Metals Division, American Institute of Mining, Metallurgical and Petroleum Engineers . . . the Society for Non Destructive Testing . . . the Industrial Heating Equipment Association.

AMERICAN SOCIETY FOR METALS

The Engineering Society for the Metal Industry

7301 Euclid Avenue — Cleveland 3, Ohio

STEEL

October 14, 1957

Metalworking Outlook

Technological Revolution by 2000 A.D.

Leaders in a technological revolution by 2000 will be chemistry, plastics, metallurgy, and electronics. That's what American Management Association members heard from Dr. H. J. Rand, president of Rand Development Corp., Cleveland. Plastics with tremendous tensile strength and heat-resistant inorganic fibers will provide us with the means to achieve new speeds. Atomic energy will be commonplace. Dr. Rand says we can expect to see electronic brains controlled by preset instructions in nearly every factory, farm, government office, school, and even the home. He predicts a greater use of outside consultants in the highly specialized future.

What Labor Gains by 1962?

If in the next five years labor makes gains comparable to those of the last 60 months, we can expect this kind of contract package in 1962: Average hourly wages of $2.57, nine paid holidays, three or four week vacations with reduced service requirements, more liberal pensions with vesting more common, shift differentials of 3 to 4 cents, welfare costs up 5 cents an hour, longer lunch hours, higher premium pay, and 5 cents more in SUB expenses. Dr. Jules Backman, economics professor at New York University, pointed out to the Associated Industries of Cleveland's industrial relations conference that industry must be prepared to resist demands of that order. Failure could mean higher prices, lower profits, and more labor priced out of the market.

Foot in the Door for UAW?

In 1958, the United Auto Workers would be delighted to accept an "agreement in principle" type of concession on the short workweek that initially would not be expensive. Speakers at the AIC conference speculated that the concession could merely be an agreement to start premium pay at 37 hours or some other point under 40. Consensus: "The foot-in-the-door technique is a favorite labor device."

Labor Whitecollar Drive

Organization of the whitecollar worker is still a major union objective, says James J. Bambrick Jr., National Industrial Conference Board labor specialist. The drive may be going slowly, but it will pick up speed, he believes. More white than bluecollar workers are employed today, and the gap will be even more marked in the 1960s. Of some 20 million organizable whitecollar people, only 2 million belong to unions.

The Hoffa Strategy

Busy Jimmy Hoffa will use Teamster influence on local labor councils to get them to protest ejection of his union from the AFL-CIO. He has

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little hope that they can sway the top AFL-CIO executive board from recommending on Oct. 24 that the Teamsters be dropped. But the board's recommendation must be approved at the AFL-CIO annual meeting beginning Dec. 5. There, Mr. Hoffa professes to believe, the local labor councils may be able to swing enough delegates to veto the recommendation.

Truck Freight Rates To Rise

Some truck freight rates will be boosted later this year. The Central States Motor Freight Bureau will up its rates 5 per cent on general goods, 6 per cent on steel, and 7 per cent on most other commodities. The Central & Southern Motor Freight Tariff Association decided on a 7 per cent general goods boost on shipments between northern and southern territories under its jurisdiction and a 4 per cent commodity rate increase . . . Eastern railroads want to lift rates on less than carload lots.

The Fringe in Europe

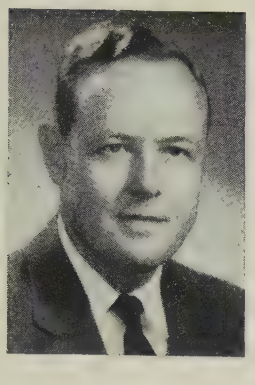
The cost of vacations with pay, employer contributions to family allowances and social security schemes, housing subsidies, and similar components of labor cost commonly add 50 per cent or more to the employer's expenditure for wages in European industry. The International Labor Organization reports that, in selected manufacturing industries in 1955, wage supplements (other than premiums for overtime) ranged from 11 per cent of labor cost in Britain to 46 per cent in Yugoslavia. They were 22 per cent in Belgium, 26 per cent in West Germany, 29 per cent in Turkey, 29 per cent in France, 30 per cent in Greece, 31 per cent in Austria, and 42 per cent in Italy.

Porter Steel Employment Steady

H. K. Porter Company Inc. reports that none of the 2000 people in its steel divisions has been laid off. Nor at the moment is there any plan to do so. Minor curtailments in hours in a few departments have been made, cutting the workweek to avoid layoffs.

Straws in the Wind

Nickel Corp. of America, a Canadian-controlled firm, has discovered nickel in Oregon . . . Orders for 20 supertankers were placed in September . . . Estimated net income of Class I railroads in August was $81 million, down $7 million from the same 1956 month . . . The Toyota, a Japanese auto, will be introduced on the West Coast within a year.



Shattered Complacency

A year and a half ago, Russia announced that she intended to launch artificial earth satellites as part of her participation in the International Geophysical year (1957-58).

That news and reports that Russia had developed intermediate and intercontinental ballistic missiles were discounted as propaganda by a complacent nation.

Our traditional philosophy was aptly expressed in 1949 by Dr. Vannevar Bush. In his book "Modern Arms and the Man," he said that the Soviet system cannot possibly advance science with full effectiveness; that it cannot even apply science to war in the forms it will take in the future without mistakes and waste and delay.

We have clung to the belief that unexcelled research and development are the product of a free society. Yet a book by Dr. Walter Dornberger, who headed the Nazi Peenemunde rocket station, confirms the contention that the V-2 came close to changing the course of world history. The Soviets, too, have matched or excelled the Free World in the development of nuclear weapons and missiles.

Even though our defense spending has averaged $35 billion to $40 billion a year, we reportedly do not have an operational missile with a range of more than 300 miles (the Army's Redstone). Our first satellite will not be launched until December.

We do not question American scientific genius. Much of it has been directed toward improving living standards as part of our American way of life. In contrast, Russian genius has been directed largely toward achievement of superiority in weapons.

Even with the menace facing us, we do not want to abandon our way of life for Russian austerity.

We believe that one of the answers lies in the establishment of a centralized agency to handle weapon research.

Another answer lies in the development of an adequate reservoir of scientists and engineers to achieve both our civilian and military objectives. Russia is graduating 120,000 a year, the U. S. only 70,000.

The first answer is up to Washington. We can all help with the second by encouraging youngsters of high school age to take science or engineering courses when they enter college.

While we deplore the fact that Russia has achieved a powerful psychological and propaganda victory, we feel that in the long run our shattered complacency will prove to be a good thing.

Now we are sadder but wiser, we hope.

Irwin H. Such

EDITOR-IN-CHIEF

and now it's....

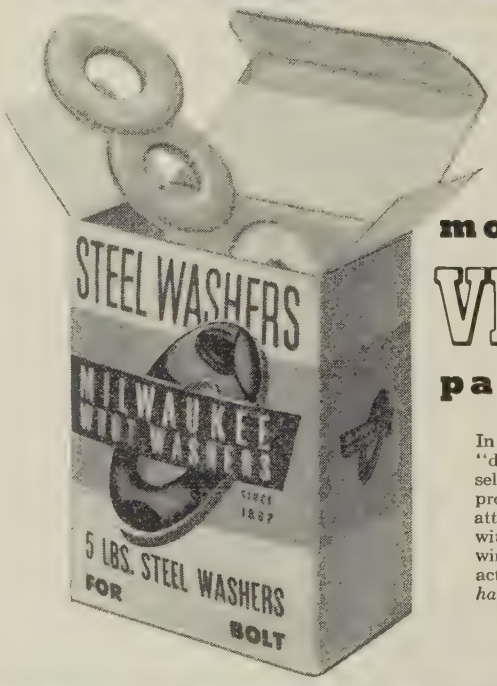
WASHED WASHERS

● Whether *dispensing* or *using* washers . . . there's great personal satisfaction in handling clean washers that don't mess up your hands nor soil the "work".

Yes, *washed washers* are the latest practical innovation introduced by Wrought Washer Mfg. Company, applying to all popular sizes of U. S. Standard and SAE Washers, including also Rivet Burrs and Machinery Bushings. All grease, graphite, oil and other foreign matter is removed by our special washing process. This is a new *plus value* over and above the consistent high quality which is an inherent part of all Milwaukee Wrot Washers . . . *at no increase in price!*

No matter what your washer requirements may be . . . every type, size, material and finish . . . look to Wrot Washer as your No. 1 source. Write for Catalog No. 40.

DEALERS: Order from your regular jobber . . . 1-lb. and 5-lb. packages, put up in 200 lb. shipping cartons.



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In keeping with a policy of "dressing up" the washers themselves, by our special washing process, they are now put up in attractive 1-lb. and 5-lb. packages with a tough, transparent Mylar window which makes visible the actual washers . . . *clean to handle, better to use.*

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THE WORLD'S LARGEST PRODUCER OF WASHERS

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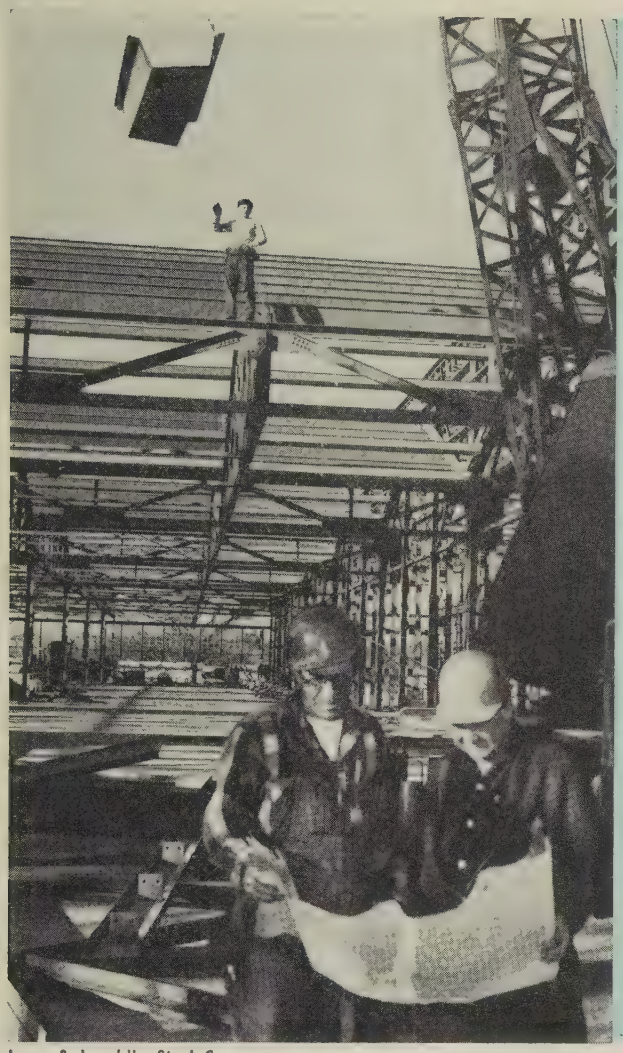
Outlook for New Construction in 1958



Jones & Laughlin Steel Corp.

	1956	1957*	1958*
		(Billions of dollars)	
PRIVATE	33.2	33.3	33.5
Residential	17.6	16.6	17.4
Industrial	3.1	3.3	3.0
Commercial	3.6	3.5	3.2
Religious	0.8	0.9	0.9
Educational	0.5	0.6	0.6
Hospital & institutional	0.3	0.4	0.4
Social, recreational, & miscellaneous	0.5	0.6	0.5
Farm	1.6	1.6	1.6
Public utilities	5.1	5.8	5.9
PUBLIC	12.9	14.1	15.5
Residential	0.3	0.4	0.5
Industrial	0.5	0.5	0.7
Educational	2.5	2.9	3.0
Hospital & institutional	0.3	0.4	0.5
Other nonresidential	0.8	0.8	0.9
Military	1.4	1.3	1.1
Highway	4.5	5.0	5.5
Sewage disposal	0.7	0.8	0.9
Water supply	0.6	0.6	0.7
Public service	0.4	0.4	0.5
Conservation & development	0.8	0.9	1.0
All other public	0.1	0.1	0.2
Total	46.1	47.4	49.0

Sources: Bureau of Labor Statistics, Department of Commerce, several construction associations.
*Estimated by STEEL.

Construction: A Record

The industry will score a dollar volume of about $47.5 billion this year, $49 billion next year, survey by STEEL indicates. Prices are tending to level out

OPTIMISTS think dollar volume of new construction could hit the magic $50-billion mark in 1958, but a STEEL survey of contractors, suppliers, association executives, and government officials puts the figure at close to $49 billion (see table).

A $50-billion year would require: 1. Easier money than most experts see for next year. 2. A surprising jump in industrial, commercial, and farm building. 3. More inflation than most people expect.

If next year's economy is a solid expression of confidence, we should have all three factors in operation by 1959. The outlook for 1958 is good: It should see us through a plateau year in construction (most of the gain will be inflationary). Such a performance should prompt planning experts to think bullishly for 1959. They'll also be influenced by the almost assured boom in the 1960s.

Prices Up a Little — The best estimate of the inflationary influence on 1958's dollar volume is 3 per cent. Some see more than that; some see a good deal less because of adequate supplies of structural steel, cement, and construction equipment.

The 3 per cent increase will cost $1.4 billion, figuring 1957's volume at $47.4 billion. Adding the two,

Construction Costs: Can They Level Off?

In Machinery & Equipment

(1947-49 equals 100)

July, 1958	**165.0***
July, 1957	157.9
July, 1956	147.8
July, 1955	134.7
July, 1954	131.5

In Labor

(Average weekly earnings in 1956 dollars)

1958	**$107.00***
1957	104.50*
1956	101.92
1955	97.76
1954	95.26

In Building Materials

(1947-49 equals 100)

July, 1958	**132.5***
July, 1957	131.4
July, 1956	130.6
July, 1955	125.7
July, 1954	120.5

*Estimated by STEEL.
Source: Bureau of Labor Statistics.

you see that the experts think we'll have a real dollar increase next year of only $200 million.

Housing Gain — In private construction, gains will stem from easier mortgage money for housing. A Bureau of Labor Statistics spokesman guesses $1 billion will come into the market. Higher prices for homes will eat up some of it: The median sales price of a home rose from $14,600 to $15,000 from 1956 to 1957, says the National Association of Home Builders.

But there should be enough money available to provide a gain of at least 80,000 housing starts over 1957's 1 million, says the BLS. An NAHB survey shows builders expect to sell homes in 1958 at a median price of $15,100, but an NAHB spokesman wonders if that won't be pushed up some by continuing increases in land and labor costs.

Industrial Drop — Other private construction next year will hold its own or be below this year's. Watch industrial and commercial building for the biggest drops. Commercial has been declining this year (it will be about $100 million off 1956's pace), and will continue to do so next year. Industrial will slack off next year by about $300 million (to $3 billion) because fewer corporations have been bullish this year in their planning. Industrial construction has held up this year because few plans made in 1955-56 were canceled—although some firms might have wanted to.

Because industrial building requires a longer look ahead than most other types of private construction, it will probably lag at the $3 billion level until 1960, believes a Commerce Department spokesman. "You don't make big plans for the future in a slack or plateau year," he reasons.

Farm Confidence? — Some observers are looking at reports of higher farm income with enthusiasm. They figure it might carry into a bigger building program in 1958, but best bets are on another $1.6 billion year for farm construction, with better things in 1959 if the improved outlook holds.

Public utilities should continue their climb, although at a lower rate next year. "They have built up momentum which should carry them through," notes BLS.

Public To Get Its Wish—Public construction, feeding the desires of everyone for better facilities quicker, will continue to boom. In fact, it will take that to give us another record construction year in 1958. The only weakness seems to be in military building, where we've had a $100 million decline this year and will get $200 million on top of that next year, reports the Pentagon. The military situation could get worse if the Bureau of the Budget keeps its iron hand on outgo.

The federal budget has little effect on other areas of public construction.

Conservation Forever—Congress has a big voice in conservation expenditures, so look for more money to be spent every year, barring a major depression.

Services Are Needed—If we fail to continue (and increase) programs for water and sewerage, we'll be in trouble quite soon, notes a construction association executive.

Highways Are Coming—Finally, the highway program promises to show some solid results next year (STEEL, Sept. 30, p. 52). The money can't be touched by a budget-cutting Congress or the Bureau of the Budget because it's safe in a trust fund. Next year's 10 per cent gain over 1957's highway spending, believe the optimists, should be followed in 1959 by at least a 20 per cent gain.

There is some evidence that the states are not building as many state roads as they should. They want to spend that 10 per cent dollar instead. (The Highway Act gives the states 90 per cent of the cost of their interstate highways from federal monies.)

Price Outlook—The accompanying charts show where prices have been going since 1953 in the construction industry. A few pessimists talk of a 5 to 10 per cent increase in costs next year. A few optimists say they will level out. Land and labor costs are sure to rise, all agree. Materials are the mystery. A few cement people are talking openly of holding the line

on prices. Consumers are enthusiastic about the good supply of steel and think they need not expect too great a boost on this item. (Steel's labor contract calls for an automatic wage boost next July; presumably, it will be followed by a boost in prices.)

Equipment Overproduced?—You don't hear it from equipment manufacturers, but talk around the industry is that construction equipment is easy to obtain and that discounts are easy to get (in the form of trade-in allowances, too). Among highway folks the thought is that construction makers overproduced last year and this, anticipating the highway boom two years ahead of time. You also hear that contractors have plenty of equipment on hand.

Summary — Construction next year will be good, at a record pace in fact. The increase won't be out of this world, and much of it will be inflationary, but it will continue to set the pace for the economy as a whole. Experts agree it will be something of a plateau year, but they look on it as only a breather before the big push.

This is the third of four articles on prices that affect metalworking. Component prices were dealt with Sept. 30. Equipment prices were covered Oct. 7, and consumer hard goods quotations will be considered Oct. 21.

An extra copy of this or other articles in the series is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

Asks Building Code Change

The American Iron & Steel Institute has asked the Cleveland Board of Building Standards & Building Appeals to consider a modification of the city's building code which would permit noncombustible curtain wall construction.

The revision would clear the way for the use of insulated panels on exterior nonbearing walls when their proximity to an adjacent structure is 30 ft or more.

The proposed revision is expected to be adopted because the present code allows 70 per cent of an exterior wall to be window space. Curtain walls also have greater fire resistance than glass.

Fabricators Hopeful for '58

Highway bridges will take more structural steel next year is word at AISC convention. Producers say 3.8 million tons will be shipped in '57, a 19 per cent gain over last year

FABRICATED structural steel bookings and shipments in 1958 will be as good or possibly a little better than this year's.

Substantial increases in highways and bridges and in public buildings will more than offset anticipated declines in industrial, utility, and commercial construction. (The prediction represented the consensus at the convention of the American Institute of Steel Construction in Coronado, Calif., last week.)

Steel fabricators will ship more this year than ever before. With schedules virtually complete, members say 3.8 million tons of material will move to jobs this year—a 19 per cent increase over 1956 shipments. Fabricators expect 1958 shipments will equal those for 1957.

See Bridges Gain—In forecasting construction for the next five years, 85 per cent of the fabricators believe that highway bridge building will account for the major portion of steel construction. It will replace industrial, including utility work, as the leader. Construction of manufacturing plants will rank second; school construction will rank third.

While backlogs of most fabricators have been declining during the last six months, there is little pessimism in the industry. Many say shorter backlogs will enable them to step up deliveries and compete better with other materials.

Complaints Down—For the first time in several years, few complaints about shortages of plain structural shapes and plates are heard from fabricators. Mill capacity for those products has been increased substantially. Production of shapes to date this year is 37 per cent above the year-ago mark. Plate output is up 38 per cent.

A few instances of price cutting are reported in the industry, a traditional symptom of easing backlogs.

Twin Front and Rear Axles Hike Payloads 30 Per Cent

These 8-wheeled GMC trucks, shown on a street paving job by Warner Co., Philadelphia, mount 9-yard, central mix concrete agitators instead of the usual 6½-yard types. Rear axles are rated at 18,000 lb each, front axles at 12,000 lb each. Power steering causes front axles to move in unison

John P. Hagan, director of Project Vanguard, inspects full-scale satellite model

Sputnik Poses Question

President Eisenhower announces U. S. trial satellite will be test fired in December. It won't be fully instrumented. Congress is asking why the Russians were first

NOW that the Russian satellite is a fact, the U. S. prepares for a thorough soul searching. The question: Can more dollars do the trick?

One thing was certain when President Eisenhower announced that a U. S. trial satellite will be launched in December. Bright-eyed rocketeers and missile power enthusiasts are finally getting their day in Washington. The visionaries have become realists.

Congress Investigates — Of course, Congress is getting into the act. There will be two rounds of Congressional activity.

First, Sen. Lyndon Johnson's (D., Tex.) Armed Services Preparedness Committee will investigate the military significance of the launching. Main question: Does sputnik mean the Russians have an intercontinental ballistic missile? Second question: Why don't we have one? Third question: Are the Russians going to beat us to the moon?

Goodyear Aircraft Corp., Akron, says it has designed a manned satellite for launching within eight years. The Air Force is ready to shoot an unmanned missile around the moon (Operation Farside). Russian scientists in Washington have indicated that they can beat both timetables if they wish.

Incidentally, Senator Johnson's subcommittee will want to know why we didn't launch our satellite first, but the Navy has already answered that: "Lack of funds did not delay Project Vanguard; we were not in a race with the Russians."

The House Appropriates — The second round for Congress will come in January when Rep. George Mahon's (D., Tex.) Defense Appropriations Subcommittee decides how much money we need to spend to stay ahead of (or catch up with) Russian science. Look for plenty of talk about a $50-billion defense budget. Expect to see an increase only in research and development funds.

In fiscal 1958, Defense has about $1.5 billion for R&D. Congress will probably double that, so we'll have to live with a $40-billion budget instead of $38 billion for defense. That will be the only concession to demands from some to go all-out in an arms race with Russia.

The Public Decides — Even though we face a totalitarian government capable of using any means to gain an end, the American public is not ready to give up the chances of a tax cut in fiscal 1958, most Washington observers believe.

Cynics are remembering a remark made in 1941: "We can lick the Japanese navy before breakfast."

Three-Cornered Fight—You are seeing the charges and countercharges evolve into three trends of thinking:

1. The administration's.
2. The manned aircraft lobbyists'.
3. The missilemen's.

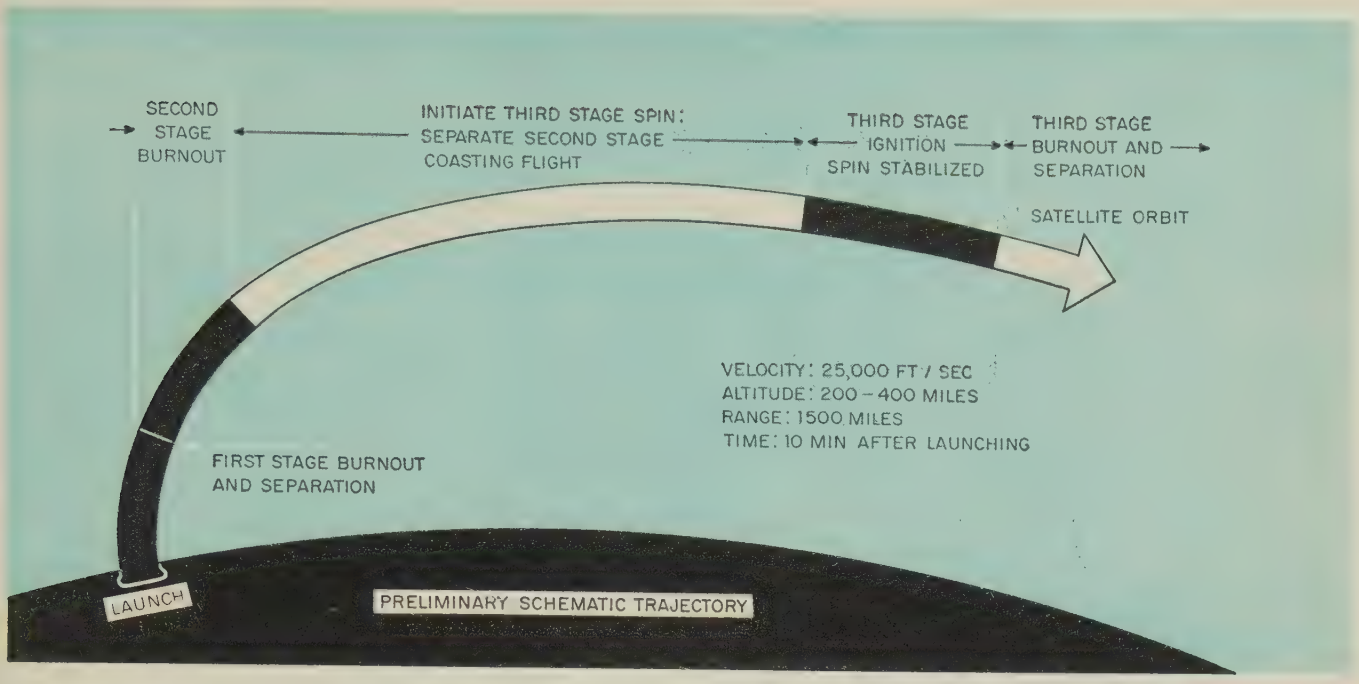
Administration ideas are quite clear:

1. Charles Wilson, retired (Oct. 9) defense secretary, does not think the Russians have an ICBM.
2. A balanced economy is needed instead of an arms race.
3. Interservice rivalry on missiles is good because it breeds a better product.

The manned aircraft people believe in our superiority over the Russians but think we must spend more money on defense, just to be sure. That money should go into more wings for the Strategic Air Command and missile development.

The scientists in the missilemen's corner think we must build more missiles pronto and in quantity, while pouring additional billions into basic research. This group feels the SAC is outmoded.

A Single Agency—The need for a single missile agency has been seriously discussed in Washington for over a year. Several voices in Representative Mahon's subcommittee are often heard on the subject. Now, some missilemen are pushing the idea of a Manhattan Project for missiles. The idea may



take hold. It is imaginative and romantic. It could take the administration off a hot spot, serve to unite the services on paper, and excuse any Congressional stinginess.

That possibility won't be thoroughly discussed until Congress reconvenes. In the meantime, there will be no crash program on missiles. We will continue to take the attitude that we can outdo the Russians when we take the time and have the money.

Industry's Job — The Pentagon will play its "private" research fiddle a little louder. While Defense spends practically nothing on basic research, it wants private firms to double their annual spending rate of $500 million. Out of this may come a new version of fast tax amortization. The Office of Defense Mobilization currently allows fast tax writeoffs on research and development of new weapons only. In these trying days, a move by the administration to extend that to moon projects might look helpful.

Satellite Made of Foil

A space-ball made of 65 cents' worth of Reynolds Metals Co. aluminum foil will be launched with a regular satellite next year.

Made of foil sandwiched to plastic, the ball will measure air thickness.

Coming: Nuclear Aircraft

Lockheed engineer says atomic-powered transport can be built which would fly nonstop around the world. Preliminary design studies have already been made

"A LARGE nuclear-powered air transport with virtually unlimited range is practical and can be built," contends Robert W. Middlewood, chief engineer, Georgia Div., Lockheed Aircraft Corp., Marietta, Ga.

Advantages — 1. It would not need overseas stocks of chemical fuel. 2. It could make a nonstop round trip to any point on the globe. 3. It would eliminate the need for a supplementary supply system. 4. It could carry over 50 tons for more than 24,000 miles. 5. Weight of the fuel would be "insignificant."

Example — A fleet of nuclear transports could move an Army division from San Francisco, land men and paradrop cargo in the Philippines, and return to the U. S. —without a stop.

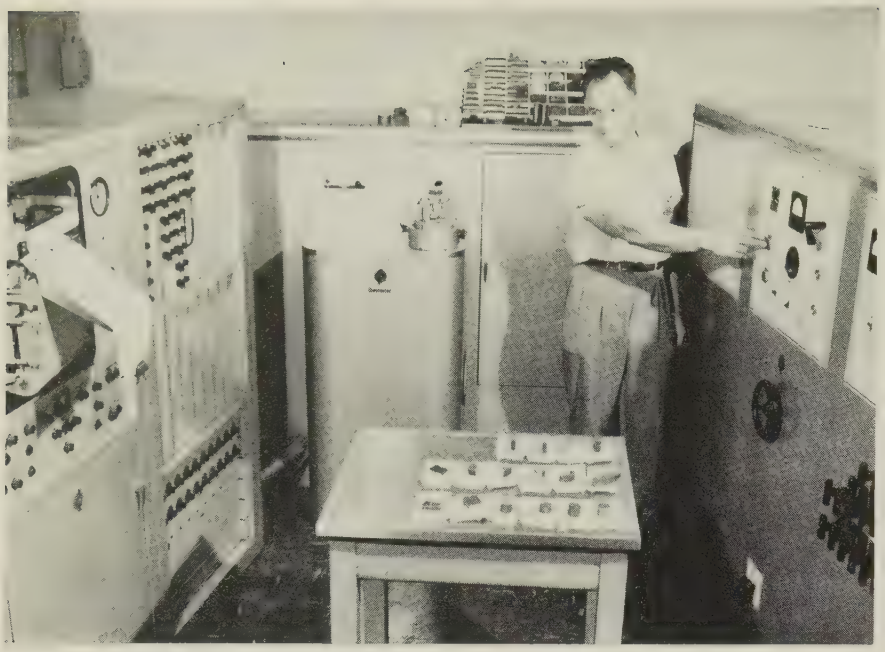
Mr. Middlewood and Robert B. Ormsby Jr., Lockheed operations research specialist, drew this word picture in a joint address to the Society of Automotive Engineers.

Design — The transport would look a lot like the Lockheed C-130 Hercules. It probably would have one reactor as the power source, though a dual-reactor powerplant is a possibility. It probably would be a prop-jet: A prop-jet will produce over three times as much takeoff thrust from a given amount of energy as a turbojet.

Other features: 1. Ease of loading. 2. Ability to use existing airfields. 3. Maximum cargo handling latitude. 4. Minimum ground handling facilities. 5. Small crew.

Problem—Weight of the reactor shielding will be a major problem. It will probably be "divided," that is, some will be around the reactor, some around crew quarters.

Work Started—A group of Lockheed engineers has made "intensive preliminary design studies." Some laboratory work has been done at the Georgia Div. plant. During 1958, operations will be started in northern Georgia at the Air Force's new, $13 million, nuclear aircraft lab on a 10,000-acre tract in the Blue Ridge Mountains.



A technician operates a quantometer in Caterpillar's new spectroscopy lab

Lab Aids Quality Control

Modern facilities replace outgrown quarters as Caterpillar drives to stay on top qualitywise and to capitalize on latest production processes and techniques

"REAL leadership can be sustained only when you're ahead of the field in workmanship and materials, not only in design," says C. A. Woodley, vice president, Caterpillar Tractor Co.

His thinking explains the reason for the firm's new testing facility at its Peoria, Ill., home plant. The Production Metallurgical & Materials Testing Laboratory covers 22,000 sq ft, employs about 150.

Two Jobs—Its purposes are inspection and new process development. Samples of all materials used in Caterpillar products are tested in the lab, as are structural steel and concrete used in building facilities.

Additional duties include evaluating new products from suppliers, designating process procedures for standardizing operations, prescribing tooling, developing new applications, providing product improvement data, and assisting in purchasing.

Facilities—The lab includes a metallurgical, chemical, and welding department, a heat treating engineering staff, a physical testing lab, a spectroscopy lab, a chemistry lab, and a photography department.

Firth Sterling Constructs

Firth Sterling Inc., Pittsburgh, will construct its fourth tungsten carbide sintering plant at Los Angeles. Scheduled to be in production by Dec. 1, it will manufacture carbide cutting tool tips and blanks, and carbide wear parts.

Builds Boats—Sans Orders

Dravo Corp., Pittsburgh, is building two unordered 3200-hp towboats at its Neville Island shipyards.

Each vessel features two 8-ft 6-in. stainless steel propellers enclosed in Kort nozzles, and six rudders operated by hydraulic steering systems. The boats are 148 ft long with 34-ft beams.

Cast Master Adds Space

Cast Master Inc., Bedford Heights, Ohio, is adding 30,000 sq ft of manufacturing area in a move to get into injection molding. The firm added 36,000 sq ft last year.

New machine tools will be installed, including a model BL Keller die sinking machine and an 8 x 12 ft boring mill with duplicating attachments. The new facilities will be in full production early in November.

Island Site for Page-Hersey

Page-Hersey Tubes Ltd. is building a 5-acre warehousing and office center on the Annacis Industrial Estate, which is on an island in the Fraser River, near Vancouver, B. C.

Operations Centralized

United States Drill Head Co., Cincinnati, has completed the first phase of a $750,000 program designed to centralize the company's divisions—a 7000 sq-ft plant for the firm's Standard Foundry Div.

Under construction is an 11,000 sq-ft structure to house the Standard Pattern Div. It's expected to be completed in early 1958.

The final phase will be a 45,000 sq-ft building for the Machine Tool Div.

Chevy To Build Foundry

Chevrolet Motor Div., General Motors Corp., will build an aluminum foundry near Massena, N. Y. It is scheduled to begin making castings for engines and transmissions in June, 1959. The plant will employ about 700. Reynolds Metals Co. will supply aluminum.

Champion Pushes Research

Champion Spark Plug Co. is building a $1-million engineering and research facility adjacent to its plant in Toledo, Ohio. Two buildings, totaling 35,000 sq ft, are included in the project.

Here's What To Look for Now*

- Some decline in industrial production.
- Unemployment rising to 5 per cent of the labor force, or 3.5 million.
- No rise in wholesale price level.
- A fairly stable cost of living index.
- Slight rise in GNP and disposable income, due to nonmanufacturing elements.
- Considerable debate over shorter workweek.
- Decline in plant and equipment and military expenditures.
- Stability in construction.
- A better year for autos in '58 than in '57 and '56.

*Source: Dr. Richard A. Lester, Princeton University economics professor.

Next Ten Years: Going Up

THE ECONOMY is too dynamic and too full of props for any business decline to last long . . . industrial production and employment will dip for the next six to eight months . . . wage hikes next year will be smaller . . . creeping inflation will continue for the next decade.

The predictions were made by Dr. Richard A. Lester, Princeton University economics professor, at an Associated Industries of Cleveland industrial relations conference.

Inflation—Prices will continue to rise for the next ten years. There may be short periods of stability, but the upward pressures on the cost of living will outweigh deflationary forces, Dr. Lester thinks.

Its Causes — Underlying influences causing the upward trend include: 1. The cold war, large-scale defense spending, and a high level of cost-raising taxes. 2. The determination of national governments to maintain full employment and expand capital equipment. 3. Rapid technological advances which stimulate the demand for capital goods. 4. Government price support programs. 5. Union pressures on wages. 6. Rapid population growth with a great relative increase in the number of children and the aged, who are consumers but not producers.

Effect—Pressure will mount to up benefits and cover medical expenses of those already on company pensions. Dr. Lester foresees unemployment at an average of no more than 4 per cent of the labor force over the next decade; labor shortages will continue.

Another Effect — Inflationary periods trigger across-the-board increases in wage costs. The result: Compression of the wage structure. The differential between skilled and unskilled workers' wages is diminished. Dr. Lester warns companies to provide a structure of differentials sufficiently progressive to provide proper motivation.

Immediate Future—The American economy seems to experience a "catching up" period every three of four years: Inventories are drawn down; capital expenditures decline; and manufacturing falls off as much as 10 per cent.

Tax reduction, expected in 1958, will stimulate long term expansion, believes Dr. Lester, but it will come too late to bail us out of any short recession we may experience.

Shorter Workweek — In industries with declining employment, the pressure for shorter hours will be strong. Otherwise, there's not much demand for it from the worker himself, notes Dr. Lester.

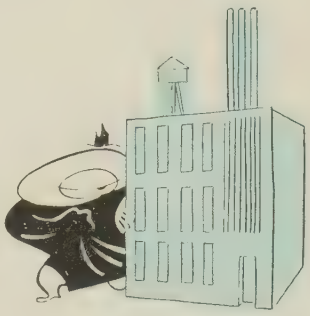
Wage Settlements—Unions will have to settle for a smaller wage hike in 1958 than they got in '56 and '57. Employer resistance will be stronger. Workers' will to strike will be weaker. Wage negotiations open next March and April in aircraft. Increases will be under 8 cents an hour per year for wages, or under 10 cents if fringes are included, predicts Dr. Lester.

Contracts with the automotive Big Three expire in June, with large farm implement makers in July and August, and with big glass producers in September. General Electric Co. and Westinghouse Electric Corp. open employee security negotiations in October.

The auto negotiations are the crucial ones. Dr. Lester believes that the United Auto Workers' position will be stronger in 1958 than it was in 1955. The auto firms have taken no action to counter the UAW's one-at-a-time technique. He thinks the union will be concentrating more on bread-and-butter issues. The shorter workweek will have appeal only if many auto workers are unemployed.

The Next Decade — The adult population (25 to 45) will number about the same in 1965 as in 1955. The Bureau of Labor Statistics foresees a 10 million increase in the labor force over those ten years. But most of those people will be under 25 or over 45. About half will be female. While the work force rises 15 per cent, total population will rise 20 per cent. Needed: Re-examination of hiring, promotion, and retirement policies.

Who's Spooking The Nicaro Sale?



CLOAK AND DAGGER enthusiasts are hinting that the sale of the government's nickel plant at Nicaro, Cuba, is filled with trouble for would-be purchasers.

Why certain parties would foster such ideas is anybody's guess. They warn about trouble from Congress, from the Cuban government, and from the General Services Administration (the agency which will sell the plant). Perhaps some interested firms will be discouraged from bidding on the plant by all this activity. The GSA sincerely hopes not, and you can be sure the Justice Department is not going to go out of its way to give any potential U. S. purchaser a hard time.

Justice Wants It Sold

Atty. Gen. Herbert Brownell's latest report to the President and Congress on competition in the nickel industry is a monument of tact. Yet a close reading of the 91-page document brings but one conclusion: Justice is anxious to see increased competition in nickel.

Under Defense Production Act nickel expansion programs, International Nickel Co.'s share of the U. S. market has shrunk from 95 per cent to 66 per cent. By 1961, Mr. Brownell guesses it may be less than 60 per cent. A vitally competitive Nicaro (privately owned) could hasten that decline. Nicaro will produce 45 million lb in 1957, and 1958's production could run higher than its annual capacity of 50 million lb. Last year, Nicaro supplied 29 per cent of the nondefense market price nickel used in the U. S.

GSA Will Name Terms Soon

Terms for the sale will come from GSA this month. National Lead Co. now operates the plant for the Cuban Nickel Co., a Cuban corporation whose stock is owned by the U. S. government.

Bids will be on the plant itself, all facilities (including a town), and ore bodies. Nicaro represents about $96 million of federal funds, a net investment of $85 million. GSA will solicit sealed bids. If the offers don't come up to Nicaro's appraised value, GSA doesn't have to sell. In that case, it can try to negotiate a higher price from the bidders. That failing, it can negotiate the sale privately with the firm it thinks most likely to buy. Chances are there will be no need for any negotiations after original bidding. Nicaro is a profitable operation; several firms will probably come in with good bids.

National Lead's position is enviable—if it wants the plant. Having operated Nicaro, the firm knows its potential. GSA is trying to decide how to set the terms so all interested bidders will be given equal knowledge.

Congress Wants Its Fair Price

Naturally, Congress is keeping its eye on the situation. At present, there is little indication of any "giveaway" cry. GSA is on excellent terms with Sen. A. Willis Robertson's (D., Va.) Joint Defense Production Committee. GSA Administrator Franklin Floete convinced the committee of his honesty and sincerity in recent negotiations with aluminum companies to cut puts to the government (STEEL, Aug. 5, p. 62).

If Mr. Floete gets Nicaro's appraised value, Congress will be happy. Defense needs for nickel are taken care of through the National Industrial Reserve Act, which will keep Nicaro available to the government in an emergency. The Defense Department has, of course, given its O.K. for the sale.

To back up Justice's position and eliminate any trouble from Congress, don't be surprised if GSA says the bidding will be open only to U. S. firms.

Cuba Wants Its Taxes

The Cuban government makes it easy for new industry by giving tax breaks. There is some doubt about Nicaro's status. It's not new, but it will have a new owner when it is sold. Undoubtedly, Cuba will negotiate with the owner on taxes.

Cuba is getting inquiries from interested bidders. The government will probably make no formal announcement of its stand until the sale is completed, but any indication that it would not negotiate would queer the sale, and Cuba doesn't want to lose its tax revenues from Nicaro. The plant is in a province where civil strife has centered lately—all the more reason for the government to want Nicaro to prosper.

Missile Industry Group Formed

On Oct. 22, a second meeting of members of the missile industry will be held in Washington to get the Association of Missile & Rocket Industries (AMRI) underway. It promises to give all interested firms (producers of missile bodies, propulsion systems, guidance systems, ground installations, chemicals, explosives, and research groups) a point of contact with service missile programs.

The services hope AMRI can solve the problem of getting them detailed statistical information on plant capacities and material available for the missile programs. The immediate goal of the association is national defense; the secondary goal, organizing this nation's industries for the era of space flight.

A legislative program for the missile industry will be one of AMRI's first projects. Membership is still open to firms large and small.

Following the beep-beep of the Russian satellite (see Page 68), the outlook for the association is good.

Foreign trainee consults dictionary in . . .

Armco's Private 'Point 4'

SELLING steel, manufacturing techniques, and good will for the U. S. has been a valuable venture for Armco International Corp., subsidiary of Armco Steel Corp., Middletown, Ohio, for many years.

Armco's "private Point 4 Program" of technical assistance to foreign companies was begun soon after the international corporation was formed in 1912.

"Armco International was established not as an export company but as an international firm," says A. R. Edwards, president. "We export and import products, technical assistance, knowhow, knowledge, and good will."

Armco has licensing agreements with 30 firms in 14 countries. Some agreements are 35 years old, as the result of renewals.

Exchange — Arrangements provide for the licensee's workers to be trained in Armco's plants and offices in all phases of steel production, including accounting, cost analysis, purchasing, and shipping.

Armco experts are sent abroad to help licensees solve production problems.

It would be difficult to determine how many foreign workers have been trained by Armco since the international corporation was established, but about 1000 have been in Middletown since the end of World War II.

"This training is not given gratuitously," says Mr. Edwards. "We believe that the things people learn mean more to them if they have to pay for them.

"Also, the association that develops between foreign workmen and Americans contributes a great deal toward international understanding. All our licensing agreements result in mutual benefits to Armco and the licensee."

Currently, 20 foreign workmen are training in Middletown, but there have been as many as 200 at one time. Of the present trainees, nine are from Spain, six from Italy, three from France, one from Japan, one from Mexico.

Placed in Homes—Armco obtains quarters for the trainees in private homes in Middletown. Usually, the visitor becomes thoroughly integrated in the American family. He goes shopping with them, goes to shows, and participates in sports.

Five Middletown girls have married trainees, and there is a heavy flow of mail between the small city and the home towns of ex-trainees.

All expenses are paid by the trainee's employer, including his living expenses, which Armco disburses every two weeks. Training periods vary from one to six months; some trainees have remained a year.

Trainees are carefully selected by their employers and are given some basic English before their departure. Armco reports not a single behavior problem and on the average, a trainee understands enough English to start on a training shift after a month. Training is conducted by regular Armco workmen.

Objectives—"We learn as well as teach in these relations," says Mr. Edwards. "Obviously, we earn a fair profit on our investment, and over the years it will help the whole economy.

"When these techniques are taught abroad, usually the demand for steel products becomes greater than the productive capacity of the newly established industry, creating markets for American production.

"As you raise the living standards and increase the purchasing power around the world, you increase demand for all U. S. products," he concludes.

Hyster Builds New Plant

Hyster Co., Danville, Ill., is building a new plant on a 53-acre site in Danville. Ernest G. Swigert, president, says it will provide more manufacturing space for industrial trucks and allow the firm to add new products.

Foremen: 20 Years Hence . . .

A foreman of the future must have a pretty high degree of intelligence, believes American Steel & Wire's director of training, Kenneth Moody.

"Twenty years ago, a foreman ran his schedule out of his hat, but, today, the production planning staff draws up the schedule weekly," he says.

"Twenty years from now, the computer will plan the schedule, and the foreman will have to spend more time on budgeting, costs, and other truly management responsibilities."

Firms should not train a foreman to replace a foreman but to handle the problems in the years ahead.

"A new machine is not designed exactly like the one it replaces," says Mr. Moody, "but it has new and improved features."

Management's First Line

SOME management is losing major functions to unions more through default than from labor's aggressiveness, believes an industrial relations expert.

"If the foreman operates through trial and error without proper training and is not informed of company policies and decisions, he cannot possibly answer questions of his men or communicate to them any feeling of stability or teamwork. It is only natural that they turn to the union," he explains.

They're Prime Movers—Successful metalworking companies, especially the larger ones, are becoming increasingly aware of the important role the foreman plays in the efficiency and pace of production.

He is management's most direct contact with hourly workers, and he deeply influences their company attitudes.

Industry is spending a lot of money and employing specialists to discover and develop leaders.

Several Goals—To find out what makes a leader tick is one of the basic aims of foreman training programs, says Kenneth Moody, director of training for the American Steel & Wire Div., U. S. Steel Corp.

Other aims:

"To get the willing co-operation of our employees," says the vice president of an automotive supplier.

"To improve the performance of the individual in three areas—technical, administrative, human relations," says B. B. Hauserman, human relations manager, Jet Div., Thompson Products Inc., Cleveland.

"To teach leadership and the modern problems of management under modern conditions," adds a fastener executive.

Teaching Theories Vary—Foreman training ranges from the old fashioned idea of putting a man on the job under a good general foreman to the formal school approach.

"Too many industrial firms still use the 'Friday night appointment' method," says J. W. Vanden Bosch who administers a program for the Cleveland Chamber of Commerce.

"On Friday afternoon, someone reminds the superintendent that old Joe retired on Wednesday, and the department has to continue Monday morning. The superintendent looks around as the crew walks off the job and names the best mechanic he sees to be foreman."

Finding Candidates—American Steel & Wire gets its foremen from within its own organization, but they come up through two different routes. Some are made by upgrading wage earners, others are selected from college graduates at the time they join the firm.

Selection of wage earners is based on work records, reports of supervisors, outside activities, and interviews.

College graduates are selected on the basis of interviews, plus results of a 3½-hour psychological test. The test, conducted and scored by Western Reserve University, is given to all college graduates after they have been hired by American Steel & Wire.

Those tagged to be foremen are trained in different staff operations to give them "a well-rounded

A Good Foreman Should . . .

1. Be able to understand his part in the whole company operation in addition to understanding the machines he works with.

2. Be able to visualize getting work done by others rather than doing it himself.

3. Be able to appeal to what the late Samuel Gompers called "the spirit of voluntarism."

4. Be conscious of the fact that he serves the interests of the customers, the workers, and management.

5. Be conscious of the fact that profit is a necessity.

6. Be interested in civic affairs and people.

7. Be able to have the courage of his convictions, and, if necessary, stick his neck out occasionally.

picture of the whole division."

American Steel & Wire does not use temporary foremen. "We have found that this causes great anxiety," says Mr. Moody.

Another View—Thompson Products' Jet Div. makes 90-day appointments. After the probationary period, the individual's aptitude is reviewed and he is either given a permanent appointment or returned to his hourly rate status.

"The practice has caused no difficulty," says Mr. Hauserman. "In fact, often the man requests return to his old status."

Jet Div. foremen are chosen from within the organization. An appraisal program based on job records, attitude, promptness, and reports of immediate superiors turns up candidates.

When a man is selected, he is given an aptitude inventory test to determine mental alertness and mechanical comprehension. His training includes on-the-job instruction, night classes, and courses at technical colleges.

"We seek harmony and productivity, plus growth; to attain these ends, we must have rapport between supervisor and workman. This is a matter of personal relationship. This potential between two people cannot be predetermined by any test," says Mr. Hauserman.

Another View—Cleveland Graphite Bronze Co., Cleveland, also promotes foremen from within. A worker's potential is determined from ratings given him by his supervisor, the personnel department, and the plant superintendent.

"We used selective tests during World War II but discontinued them because we found them inconclusive," says Fred Laffer, director of special service (training).

Graphite Bronze conducts a regular appraisal of all management personnel. It's done by a committee in the plant and area where the individual works. Findings are always discussed with the person appraised.

"The program is highly satisfactory," says Mr. Laffer. "Foremen are spending extra time to improve in areas found weak, and the over-all result is an excellent manpower survey for the company."

Another View — At another firm, group discussion is the basic technique. Superintendents and their assistants are brought into the home office periodically for training in human relations.

This firm terms human relations the keystone in building management co-operation, which it sees as the ultimate aim of all foreman and management training.

Supervisors play the leading role in improving the performance of employees to increase production, it says. Superintendents and their assistants attend lectures, do skits to illustrate the solution of problems, then discuss what they learn.

They return to their plants for a repeat performance with their foremen participating.

Every new employee is given a vocational test. After that, the observation of his foreman, his performance record, and interviews determine his potential as a foreman.

When selected, the individual undergoes broad training in management, shooting for these goals: 1. To learn an over-all picture of his duties. 2. To learn how they should be done. 3. To learn why they should be done and to develop judgment.

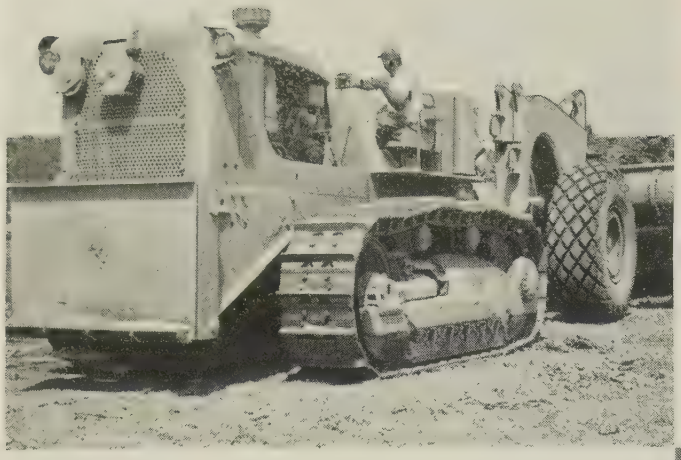
Qualifications—All training officials agree that a man's age is considered along with his health and general well-being. But none of the companies contacted has any firm rules regarding age.

Mr. Laffer sums it up: "Obviously, we will take several looks before choosing a man near retirement. But we have some pretty young fellows and some mature ones operating successfully."

Cost of Program—The money involved can't be separated from the cost of general management training and development—of which it is a vital part. But companies with planned programs are convinced that they more than pay for themselves in increased morale, which, in turn, increases production and efficiency.

Small firms that can't afford specialized training can take advantage of courses offered by local organizations. In many industrial cities, chambers of commerce put on foreman training courses for member firms. Some charge nominal fees. Others do it for free.

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, Ohio.*



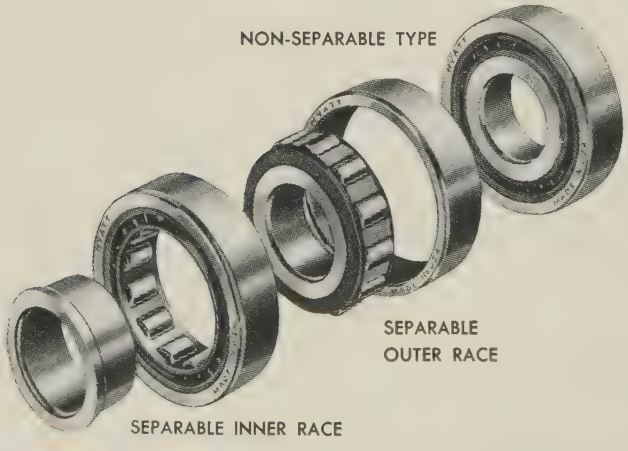
THE HEAVIER THE LOAD...

the more you need HYATTS . . . because nothing else can equal straight cylindrical roller bearings for sheer load-carrying capacity. That's why many of the world's largest crawler tractors are equipped with HYATT Hy-Rolls.

THE HIGHER THE SPEED...

the more you need HYATTS . . . because they are precision-built with painstaking control of internal clearances to run smoothly even at 40,000 rpm, as in this Solar portable gas turbine pump developed for fighting fires.

THE MORE YOU NEED *Cylindrical* HY-ROLL BEARINGS



Heavier loads and higher speeds, which must often be accommodated in more compact housings than ever before, are causing problems for many a design engineer these days. If you're among those who are finding that previously-used bearings are no longer good enough, *it's time to switch to HYATTS.* In America's most complete line of straight cylindrical roller bearings you'll find space-saving separable types with ample capacity to carry your radial loads, or flanged race types which will take a surprising amount of thrust. When you lay in HYATT Hy-Rolls you make *sure* of longer, smoother performance at the lowest cost per hour of service. Ask your nearest HYATT Sales Engineer for recommendations —you'll find him mighty helpful! Hyatt Bearings Division, General Motors Corporation, Harrison, N.J.; Pittsburgh; Detroit; Chicago; and Oakland, California.

THE RECOGNIZED LEADER IN CYLINDRICAL BEARINGS

GM GENERAL MOTORS

HYATT HY-ROLL BEARINGS

THE "WORKHORSES" OF MODERN INDUSTRY

Checker Cab: Automaker

Next spring, it will start marketing a passenger car that's a modified version of its taxi. No style leader, the vehicle will feature roominess and its $2500 price tag

CHECKER CAB CO., Kalamazoo, Mich., plans to start producing a passenger car next March.

First year output is set at 12,000 units. The price will be about $2500, plus transportation charges. Since the car will be sold through factory branches, there will be no dealer markup.

Morris Markin, Checker president, says he's bringing out the passenger car to meet demands for a solid, roomy automobile at a low price.

Specs—The car is a modified version of Checker's taxi models. It will have 120-in. wheelbase and an over-all length of 199.5 in. Height is 61 in.; width is 77 in.

It'll be powered by a 6-cylinder, overhead valve Continental which develops about 140 hp. Mr. Markin figures fuel consumption will run 20 to 21 mpg on the highway. Checker cabs have 80-hp engines; driver reports covering several years indicate an average of about 14 mpg around town.

Comfort—Herbert Snow, Checker's chief engineer, designs the vehicles for solid construction and comfort. He was the man who engineered the Cord.

There's no pretense at fancy styling. The car somewhat resembles a 1951-52 Plymouth in general body lines. It's a walk-in instead of a crawl-in car. The rear floor is only slightly rounded for the driveshaft, and there's 27.5 in. of legroom between front and rear seats.

Mr. Markin has included a wrap-around windshield, but it doesn't swing way around and stick out to hit your knee as you enter the car.

Construction—Tooling has cost about $5 million. Passenger and cab versions have slightly different hood and deck panels.

Features like steel interior panels and extra heavy chrome plating make for few rattles and little rust. Brakes are self-adjusting, heavy duty jobs. The roof is lined with glass fiber and covered with Masonite acoustical board.

Accessories — Automatic transmission, heater, power steering, brakes, and power windows are standard equipment; a radio is an optional item. The car will have dual headlights — probably the most distinguishing exterior difference between it and the cab.

Mr. Markin is planning on two-tone paint jobs. He won't have annual model changes because the car isn't supposed to be a style beater. Its solid, conservative construction makes Mr. Markin call it an "economy Cadillac."

Service — Checker Cab operates more than 5000 of its own vehicles; its wealth of service experience will help Mr. Snow keep advised of needed modifications.

Many parts to be used are standards in the auto industry. The company will furnish a list of them so owners can go to any garage for service.

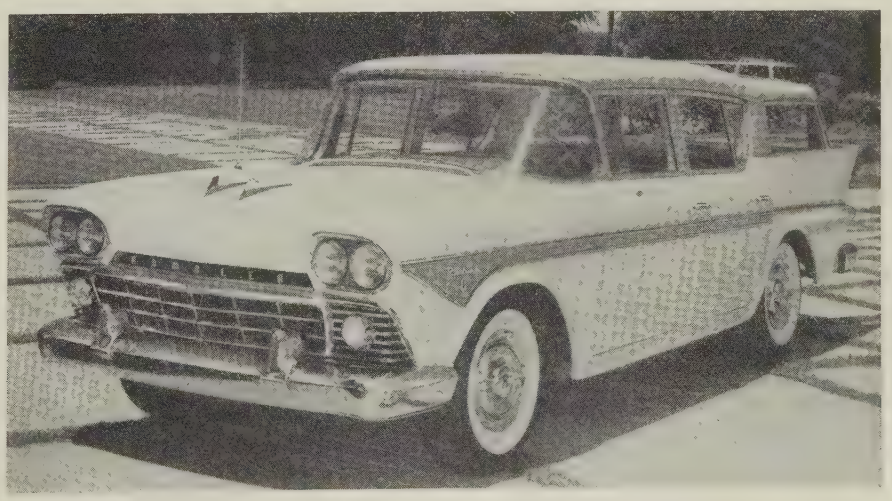
History—Checker originally had cab franchises in Chicago, Pittsburgh, New York City, and Olean, N. Y. They are operating subsidiaries of Parmelee Transportation Corp., Chicago. Checker owns 62 per cent of Parmelee's stock, but the Checker name is in general use (See STEEL, Nov. 7, 1955, p. 101).

In 1956, the cab company brought out a new taxi model and started moving into other areas. It takes 12 to 18 months for buyers to test cars for fleet users, so Mr. Markin just now is getting cab production up to full steam.

While waiting, he has set up 12 factory branches around the country, in addition to the four original outlets. Mr. Markin plans to have 30 to 35 branches by next spring.

Demand—Will the car sell? Last month, STEEL received a letter from a West Virginia reader who said: "Living in an area where we still have some rural roads, we see the need for a car adaptable to this use. It seems to me this need for a specialized car is being met by Checker cabs."

So it looks like Mr. Markin has one buyer waiting. And judging from the number of people who



Rambler Moves to Fins

AMC's Rambler Rebel has the same body dimensions as the 1957 Rambler V-8. Pushbutton transmission controls are new. The V-8 OHV engine has an 8.7:1 compression ratio and turns out 215 hp at 4900 rpm. Displacement is 250 cu in.

B-O-P Plants Use Bridge To Spot Check Quality

All seven Buick-Oldsmobile-Pontiac assembly plants are using this checking-styling bridge. It checks 74 dimensions of the 37 basic bodies assembled by the division. Four or more bodies are spot checked at each plant daily

pass up other taxis in favor of an easy-to-enter Checker, he probably has many more.

Ford Ponders Economy Car

Ford Motor Co. is studying foreign car sales to see if it's feasible for the firm to build its own economy car in the U. S.

Right now, Ford is importing its English-built cars for the American economy market.

James J. Nance, vice president and general manager of the Lincoln-Mercury Div., says economy car sales will have to increase to 5 per cent of the total U. S. market before the company could consider building such a vehicle in this country.

For the first seven months of the year, import sales have totaled 103,000 units (2.8 per cent of the market). The industry expects imports to reach 150,000 by the end of the year.

Predictions are that 250,000 small cars will be sold in 1958. If industry sales reach 6 million next year, the figure will be just 50,000 units shy of the 5 per cent Mr. Nance is talking about.

New Twist—His statement has caused some eyebrow raising in motordom. It costs as much to design and tool a cheap car as it does to turn out a more expensive, conventional model. Most auto chiefs have indicated they wouldn't consider building their own until they could see an annual market of a half million cars.

Studebaker-Packard and American Motors have avoided high engineering costs in bringing out the Scotsman and Rambler American (AMC's junior car) by utilizing existing dies and tooling.

If Ford wants to play this game, it may try the same tactics.

Here are the current competitors on the economy car market: Volkswagen, Volvo, S-P's Scotsman, AMC's Rambler American, Metropolitan, Opel, Vauxhall Victor, Renault Dauphine, English Fords, and the Hillman group.

U. S. Auto Output

Passenger Only

	1957	1956
January	642,089	612,078
February ...	571,098	555,596
March	578,826	575,260
April	549,239	547,619
May	531,365	471,675
June	500,271	430,373
July	495,629	448,876
August	524,354	402,575
September ..	284,265	190,716
9 Mo. Total	4,677,136	4,234,768
October		389,061
November		581,803
December		597,226
Total		5,802,808

Week Ended	1957	1956
Sept. 7	90,704	47,827
Sept. 14	85,816	63,798
Sept. 21	52,365	35,652
Sept. 28	51,552	43,369
Oct. 5	22,050†	59,367
Oct. 12	40,000*	70,175

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

Preview Highlights

Here are sidelight comments and predictions from division heads speaking at previews of 1958 cars.

Oldsmobile — General manager, Jack Wolfram, says the medium priced market annually has accounted for 32 per cent of sales in the last 11 years (through 1956).

"All indications are this market will grow in the future," he adds. For Olds, Mr. Wolfram says he expects 8 per cent of industry sales next year. This year, it will place fifth in national sales.

American Motors—George Romney, AMC president, predicts: "Before the end of the 1960s, more than 50 per cent of the cars sold in the U. S. will be smaller than today's Ford, Chevy, or Plymouth."

He adds one reason why he expects Ramblers to sell well: The buying public no longer depends on an automobile to reveal social status. Prestige can be satisfied by buying boats, planes, and swimming pools.

AMC confirms it's calling senior cars Rambler Ambassadors. The Nash and Hudson monikers have been scrapped. Its junior line is a revision of the old Nash Rambler to be called Rambler American.

Cadillac—James M. Roche, Cadillac's general manager, reports his division will sell about 150,000 cars in calendar 1957. He expects next year's sales to be about the same, perhaps up to 155,000.

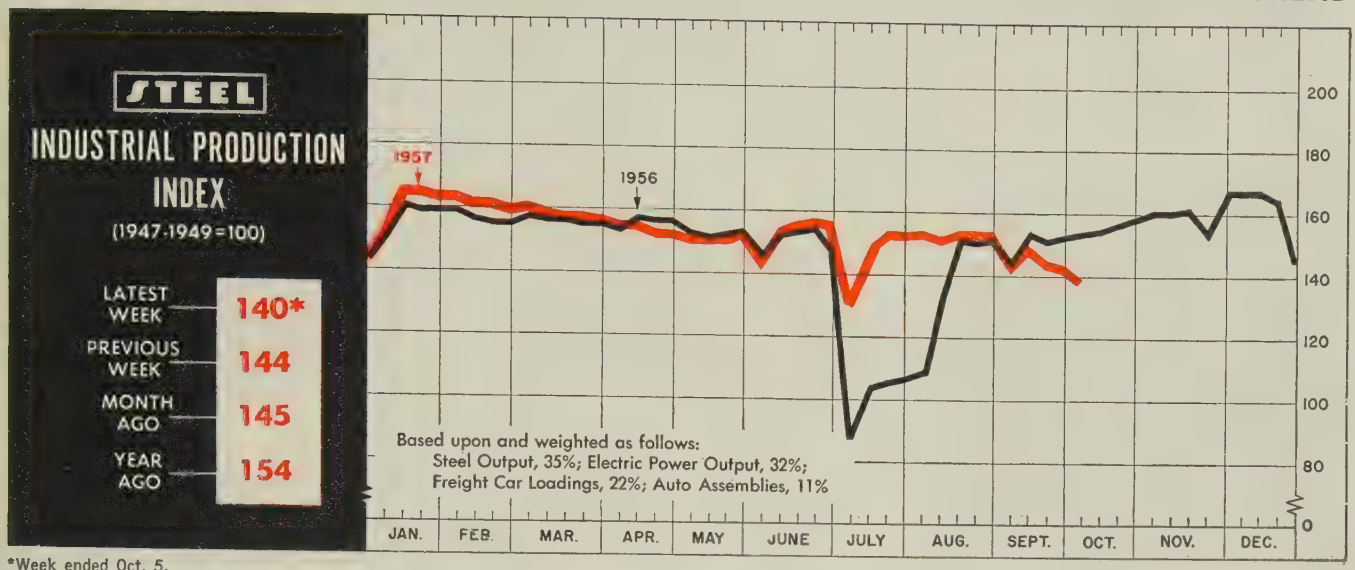
Luxury cars probably will hit from 290,000 to 300,000 sales in '58, adds Mr. Roche. He thinks total industry sales in 1958 will equal and possibly better 1957's.

One-third of the 1957 Cadillacs have air conditioning.

Pontiac—S. E. Knudsen, general manager, says Pontiac hopes to take 8 per cent of a 6-million car market in 1958. It may build 358,000 cars this year and is aiming for fifth place in 1958.

Pontiac has rebored its blocks to give up to 370 cu in. of displacement. This means top horsepower of about 310, although most engines will be rated at about 270 hp.

Of 3800 Pontiac dealers, 537 have been signed to handle GM's Vauxhall Victor.



*Week ended Oct. 5.

Employment May Level Off in 4th Quarter

EMPLOYMENT should take an upturn this month, but don't be surprised if it doesn't. While the lack of a strong seasonal rise in production (see STEEL, Oct. 7, pp. 137-138) does not rule out a rise in employment, it puts a damper on prospects.

Factor One—Two general factors work against any sizable increase in labor at this time. First, despite several weaknesses in the economy, the nation has had virtually full employment throughout the year. Unemployment has been about 4 per cent of the total work force. So any significant advance in the number of jobholders is ruled out.

Employment has remained strong in the face of easing production largely because many employers have cut overtime or reduced the workweek rather than resort to wholesale layoffs. In a few hard goods industries and defense plants where cutbacks have been most noticeable lately, a high percentage of the released employees has been absorbed by other industries. Skilled workers are still in short supply.

Factor Two—The pressure is off production. Manufacturers are content to wait and see before rushing into the labor market. They are living off the shelves and are content to let the "other guy" pile up their inventory. As one Cleveland labor specialist says: "This doesn't help the present situation any, but it sure sets the stage for quite a comeback."

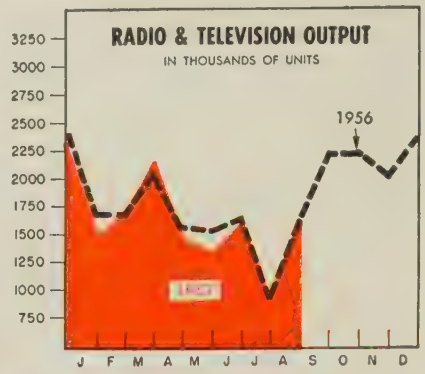
Employment has been in a downtrend since the peak was reached in July, report the Labor and Commerce departments. Although the August dip produced a surprise (the annual peak has been in that month for the last several years), the further decline in September was expected. The back to school movement, the automotive slowdown for model changeover, and defense cutbacks were the big factors.

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	2,088[1]	2,115	2,483
Electric Power Distributed (million kw-hr)	11,700[1]	11,697	11,342
Bituminous Coal Output (1000 tons)	10,205[1]	10,065	10,510
Petroleum Production (daily avg—1000 bbl)	6,800[1]	6,821	7,022
Construction Volume (*ENR*—millions)	$333.4	$342.3	$491.0
Auto, Truck Output, U. S., Canada (*Ward's*)	31,238[1]	62,167	84,113
TRADE			
Freight Car Loadings (1000 cars)	725[1]	739	815
Business Failures (Dun & Bradstreet)	278	287	251
Currency in Circulation (millions)[3]	$31,038	$31,052	$30,767
Dept. Store Sales (changes from year ago)[3]	0%	−4%	+3%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$24,110	$23,007	$23,721
Federal Gross Debt (billions)	$274.2	$271.9	$274.2
Bond Volume, NYSE (millions)	$18.5	$23.3	$19.8
Stocks Sales, NYSE (thousands of shares)	8,067	12,640	10,384
Loans and Investments (billions)[4]	$86.5	$87.1	$85.7
U. S. Govt. Obligations Held (billions)[4]	$24.5	$24.7	$26.1
PRICES			
STEEL's Finished Steel Price Index[5]	239.15	239.15	225.71
STEEL's Nonferrous Metal Price Index[6]	209.2	209.7	264.8
All Commodities[7]	117.5	117.7	115.2
Commodities Other Than Farm & Foods[7]	125.6	125.7	122.9

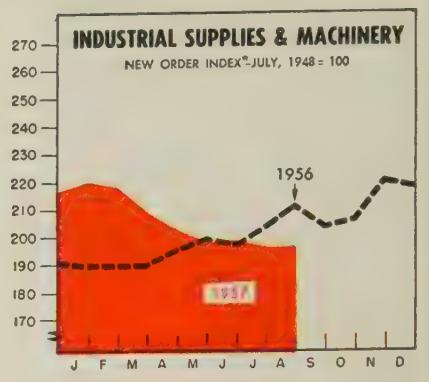
*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1957, 2,559,490; 1956, 2,461,893. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-1939=100. [6]1936-1939=100. [7]Bureau of Labor Statistics Index, 1947-1949=100.

THE BUSINESS TREND



	Radio		Television	
	1957	1956	1957	1956
Jan.	1,086	1,079	450	588
Feb.	1,265	1,094	465	576
Mar.	1,609	1,360	560	680
Apr.	1,116	993	361	550
May	1,024	1,060	342	468
June	1,088	1,073	544	553
July	613	567	360	337
Aug.	966	991	674	613
Sept.	....	1,319	...	894
Oct.	....	1,349	...	821
Nov.	....	1,382	...	680
Dec.	....	1,715	...	627
Totals	....	13,982	...	7,387

Electronic Industries Association.



	1957	1956	1955
Jan.	221	190	160
Feb.	219	190	166
Mar.	210	190	171
Apr.	203	195	172
May	199	199	177
June	199	197	189
July	197	203	182
Aug.	197	211	186
Sept.	...	203	196
Oct.	...	206	195
Nov.	...	220	194
Dec.	...	218	191

*Seasonally adjusted.
Amer. Supply & Machinery Mfrs'. Assn.

Purchasers Cautious—Much of the hesitancy in the October outlook stems from reports of purchasing agents' groups. The national association reported in September that 28 per cent of its responding members adjusted employment downward. Only 20 per cent were in this category in the July report.

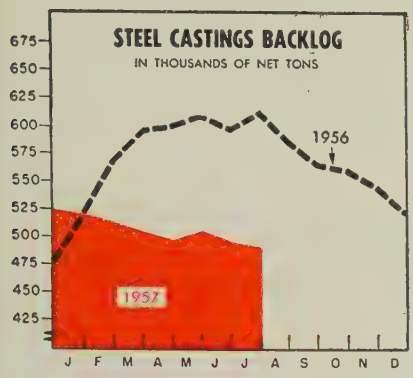
Total employment in the steel industry is also down, with little immediate hope of an upturn. The August figure was estimated at 663,100 by the American Iron & Steel Institute, which was off 2200 from July's total. Steelmaking operations in September were not enough above the August rate to warrant significant hiring, and so far October doesn't look much better than September. Eventually, there will be some pickup in this industry, but nobody wants to say when.

Ray of Sunshine—Not all the employment news is dreary. The Department of Labor says that employers in most of the nation's 149 principal labor markets expect a modest autumn pickup. While most of the improvement will be in nonfactory activities, some of it will result from the new model buildup in motordom. Plus factors will be in electrical machinery, fabricated metal parts, and other suppliers to the auto people. Construction and food processing will cancel out some of those gains, and further defense cutbacks might cut deeper into aircraft employment.

Index Hits Bottom

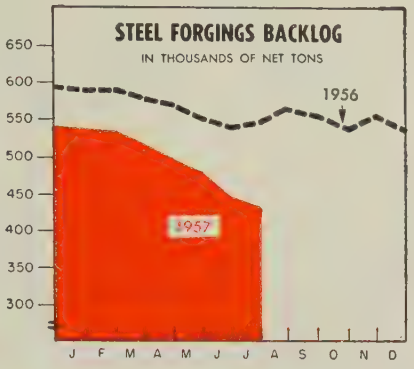
STEEL's industrial production index dropped 4 percentage points during the week ended Oct. 5 to wind up with a preliminary 140 (1947-49 = 100). You have to go back to the week ended Jan. 15, 1955, to find a reading that low, with the exception of 1956's steel strike period and the July 4 holiday weeks. There is no cause for alarm, though, because practically all the decrease from the high level of late August can be traced to the auto industry. Model changeover bit deeper into the index this year than in any year since the 1947-49 benchmark was adopted (1953).

In August, motordom contributed 15 points a week to the index. During the first week of this month, the count was only 3. However, the fourth quarter is scheduled to match the corresponding period of last year, which will add as much as 17 points a week dur-



	Shipments		Unfilled Orders*	
	1957	1956	1957	1956
Jan.	169.2	158.7	519.6	519.4
Feb.	154.9	165.4	511.8	567.3
Mar.	160.1	170.0	503.4	595.0
Apr.	162.5	163.7	497.6	600.2
May	164.6	178.2	505.0	608.3
June	153.6	164.7	494.3	597.1
July	122.0	118.0	489.4	611.2
Aug.	....	160.0	....	586.5
Sept.	....	155.0	....	563.0
Oct.	....	175.6	....	558.5
Nov.	....	164.1	....	545.9
Dec.	....	158.7	....	521.8

*For sale. U. S. Bureau of the Census.



	Shipments		Unfilled Orders	
	1957	1956	1957	1956
Jan.	148	160	537	589
Feb.	135	152	533	589
Mar.	146	159	517	578
Apr.	139	150	497	569
May	135	151	479	551
June	128	143	445	540
July	104	98	431	547
Aug.	...	123	...	562
Sept.	...	121	...	554
Oct.	...	148	...	539
Nov.	...	135	...	553
Dec.	...	130	...	538

U.S. Bureau of the Census. Data based on reports from commercial and captive forge shops with monthly shipments of 50 tons or more.

ing November and December. Steel operations probably will add three or four points as output rises to match consumption, and electric energy output will add two or three points as it builds to pre-Christmas levels. Take away three or four points because of the seasonal drop in freight car loadings and it would appear that November and December will level out around 160.

Sales Reach New High

Despite the sluggishness noted, 1957 still may end up the best on record for sales by all manufacturing corporations in the country. According to a joint report of the Federal Trade Commission and the Securities & Exchange Commission, sales in the second quarter set a record of $80.9 billion for that quarter and boosted the first half total to $160.6 billion, an increase of 6 per cent over the similar 1956 period.

The only major metalworking group failing to show a gain was the nonferrous metals industry, which has been plagued with price declines.

But profits present a different picture. In the second quarter, earnings after taxes were $4.1 billion, the same as in the first quarter and $100 million below the year-ago period. Of the 23 major groups in the report, the first half profits of nine were greater than they were in the year-ago period. Eleven reported poorer profits, and three were unchanged.

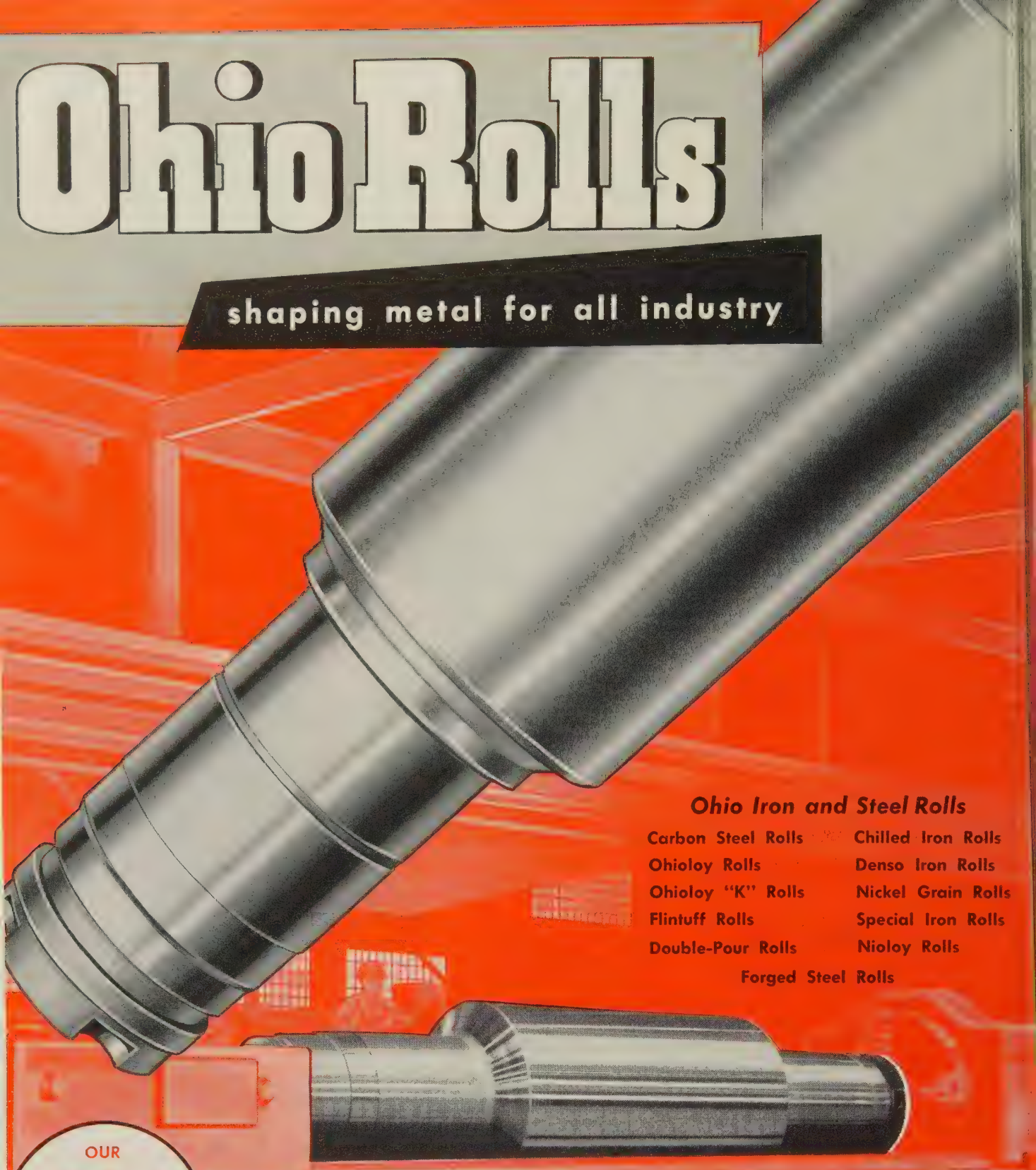
Construction Trends Mixed

Construction trends continue to show a mixed pattern. With an all-time monthly record of $4.618 billion, construction put in place through September amounts to $35.091 billion, report the Departments of Commerce and Labor. That's 2 per cent ahead of the 1956 pace.

F. W. Dodge Corp. reports that awards for future construction through August were still about 2 per cent ahead of those in the corresponding period of last year. But *Engineering News-Record* reports its tabulation of heavy construction awards through the week ended Oct. 3 was 15 per cent behind the year-ago total. While the two reports are not completely comparable, both indicate that physical volume of construction next year will do well to equal this year's.

Ohio Rolls

shaping metal for all industry



Ohio Iron and Steel Rolls

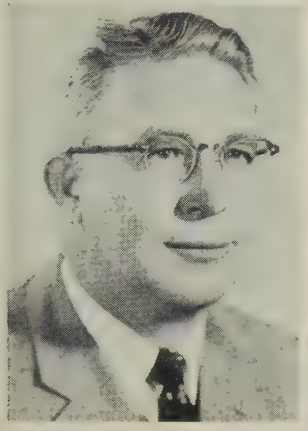
Carbon Steel Rolls	Chilled Iron Rolls
Ohioloy Rolls	Denso Iron Rolls
Ohioloy "K" Rolls	Nickel Grain Rolls
Flintuff Rolls	Special Iron Rolls
Double-Pour Rolls	Nioloy Rolls
Forged Steel Rolls	

OUR 50th YEAR
1907
1957

THE OHIO STEEL FOUNDRY CO.
LIMA, OHIO

Plants at Lima and Springfield, Ohio

ORIS



HARRY B. DAUPHINAIS
William D. Gibson mgr.

JOHN C. OORBECK
Tyler purchasing director

THEODORE S. GULYAS
Triplex gen. sales mgr.

FRANK J. FIELDS
Fosdick Machine Tool post

Harry B. Dauphinais was made general manager of Associated Spring Corp.'s **William D. Gibson Co.** division in Chicago. He succeeds **Clarence O. Goff,** resigned. Mr. Dauphinais was general manager of the Ohio division in Dayton.

John C. Oorbeck was made director of purchases, **Tyler Refrigeration Corp.,** Niles, Mich., to succeed **Paul G. Hartzog.** Until retirement in January, Mr. Hartzog will serve as consultant.

Aubrey M. Callis was appointed general sales manager, **Federated Metals Div.,** American Smelting & Refining Co., New York. He succeeds **Edgar L. Newhouse III,** now Washington representative of AS&R. **John L. Griffith** was made eastern sales manager. **J. L. Kammermeyer** was made general sales manager of a new central aluminum department at St. Louis. **R. A. Colton** replaces Mr. Kammermeyer as manager at Houston.

Felix Kremp was elected vice president, **Braeburn Alloy Steel Corp.,** Braeburn, Pa. He is in charge of sales co-ordination and market research, as well as administrative duties covering sales and manufacturing.

Benjamin Electric Mfg. Co., Des Plaines, Ill., named **John R. Bartizal** chairman in addition to his post of president. **J. H. Fall III** was elected vice president-treasurer; **George A. Hamm,** vice president-secretary; **Arthur E. Swedenborg,** vice president-sales.

Theodore S. Gulyas was made general sales manager, **Triplex Screw Co.,** division of Murray Corp. of America, Cleveland. He was with Lamson & Sessions Co.

Albert C. Weihl was elected president, **Pollak Steel Co.,** Cincinnati, succeeding **Julian Pollak,** now chairman. **David Pollak** was elected executive vice president, succeeding Mr. Weihl.

T. A. Haller was elected to the new post of vice president-engineering, **J. I. Case Co.,** Racine, Wis. He is succeeded by **P. H. Spennetta** as director of engineering, industrial division.

John J. McDermott was named production manager at **Babcock & Wilcox Co.'s** Barberton, Ohio, Works. He replaces **H. G. Lane,** transferred to the works' manufacturing engineering department.

F. W. Corbett was made general sales manager, **Ajax Composite Die Co.,** Detroit. He was production control manager of Ford Motor Co.'s tool and die plant.

Gene Chapdelaine was elected vice president of **Conversion Chemical Corp.,** Rockwell, Conn.

R. L. Halsted was promoted to general manager of **Allis-Chalmers Mfg. Co.'s** industrial equipment division, Milwaukee. He succeeds **P. F. Bauer,** recently named managing director of Allis-Chalmers International, a new division. Mr. Halsted was manager, processing machinery department.

Frank J. Fields was made works manager of **Fosdick Machine Tool Co.,** Cincinnati. He was executive vice president and general manager, Sidney Machine Tool Co.

Henry O. Westendarp was made manager of arc welding sales, eastern region, **Air Reduction Sales Co.,** New York. He was New York district manager, General Electric Co.

Thomas R. Wiltse was made plant manager at Defiance, Ohio, for **Central Foundry Div.,** General Motors Corp. He was factory manager.

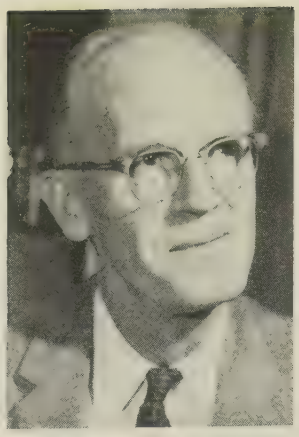
At **American Steel Foundries'** transportation equipment division, Chicago, **C. E. Grigsby,** vice president-sales, was made vice president and general manager. **William C. Taylor,** vice president-New York sales office, succeeds Mr. Grigsby and is now in Chicago. **John C. Day,** district sales manager-New York, becomes assistant vice president, succeeding Mr. Taylor. **Carl E. Tack** was made vice president and chief mechanical engineer.

Jack Lewis was made general sales manager, **Pheoll Mfg. Co.,** Chicago, commercial division. **Peter Lindsay** was made merchandising manager.

Robert A. Rothacker was made superintendent of the Beaver Falls, Pa., plant, **Union Drawn Steel Div.,** Republic Steel Corp.

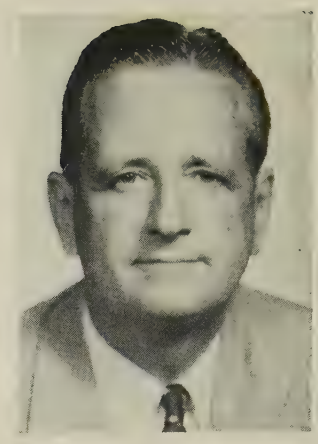
Joseph M. Franz was named Phila-

RICHARD E. KRENGEL
Ex-Cell-O (Canada) mgr.



WILLIAM H. McCOMB
American Bridge plant mgr.

GEORGE S. MIKHALAPOV
Brush Beryllium exec. v. p.



GEORGE E. GOODRICH
joins Frank Electric Corp.

delphia district sales manager by **Harbison-Walker Refractories Co.**

Richard E. Krengel was appointed general manager, **Ex-Cell-O Corp. of Canada Ltd.**, London, Ont. Previously at Detroit, he co-ordinated work of the Canadian and American plants.

Robert L. Allen was made general sales manager, **Chicago Steel Tank Co.**, division of U. S. Industries Inc., Chicago. He was with Fritz W. Glitsch & Sons Inc., Houston.

C. R. Day was promoted to plant engineer at the Ambridge, Pa., plant of **A. M. Byers Co.**

Charles D. Speier was made vice president and secretary of **Seaporcel Metals**, New York. He continues as director of sales, advertising, and merchandising.

H. M. Webber was made manager of process engineering for **Harper Electric Furnace Corp.**, Buffalo.

Ralph J. Archibald was named executive vice president and general manager, **Oro-Vista Machine Tool Co.**, San Diego, Calif.

Albert J. Belanger was named director of purchases, **Inland Steel Container Co.**, division of Inland Steel Co., Chicago.

A. W. Renken was made plant superintendent and **R. H. Wilson** administrative assistant at **Riverside-Alloy Metal Div.**, H. K. Porter Company Inc., Riverside, N. J.

James R. Uber was made Pittsburgh district manager for **Colonial Broach & Machine Co.**

William H. McComb was made manager of the Ambridge, Pa., plant of U. S. Steel Corp.'s **American Bridge Div.** He succeeds **Oscar Seidel**, retired. **James A. Dunn** was made general plant superintendent. **James A. Richardson** was made contracting manager at New York to succeed **E. M. Johnson**, now contracting manager at Boston.

George S. Mikhalapov was elected executive vice president, **Brush Beryllium Co.**, Cleveland. He was president of Coast Metals Inc., Little Ferry, N. J.

John A. Gunnarson was made acting assistant to the president of **MB Mfg. Co.**, division of Textron Inc., New Haven, Conn.

W. H. Jorgensen was made general manager, **Cleereman Machine Tool Corp.**, Green Bay, Wis.

Francis T. Greenup was made chief product engineer, **Consolidated Electrodynamics Corp.**, Pasadena, Calif. He succeeds **Armand F. DuFresne**, named chief engineer, analytical and control instruments division.

Walter H. Brown fills the new post of midwest sales co-ordinator at **Standard Pressed Steel Co.**, Jenkintown, Pa. He is succeeded by **Thomas A. Breen** as Chicago district sales manager.

R. N. Biggers was elected vice president and general manager, **Hobbs Trailers Div.**, Fruehauf Trailer Co., Ft. Worth, Tex. He succeeds **William E. Grace**, recently elected executive vice president of Fruehauf.

George E. Goodrich joined **Frank Electric Corp.**, York, Pa., as vice president-sales. He was industrial sales manager, Atlantic region, for the apparatus division of Westinghouse Electric Corp.

L. L. Fowler joined **Infilco Inc.**, Tucson, Ariz., to head its new coolant and cutting oil recovery department. He was sales manager, filtration division, Barnes Drill Co.

Roy F. Lab was made assistant general superintendent of the Warren, Ohio, plant of **Copperweld Steel Co.**

Robert Paxton fills the new post of executive vice president-operations, **General Electric Co.**, New York. Formerly in charge of the company's apparatus group, he is succeeded by **Arthur F. Vinson**, elected vice president and group executive-apparatus group. **Halbert B. Miller** succeeds Mr. Vinson as vice president-manufacturing services. **James H. Goss** was elected vice president and group executive-consumer products group.

Ernest DeFouw, manufacturing staff accountant, was named production planning director, **Sealed Power Corp.**, Muskegon, Mich. He is succeeded by **Philip T. Peisert.**

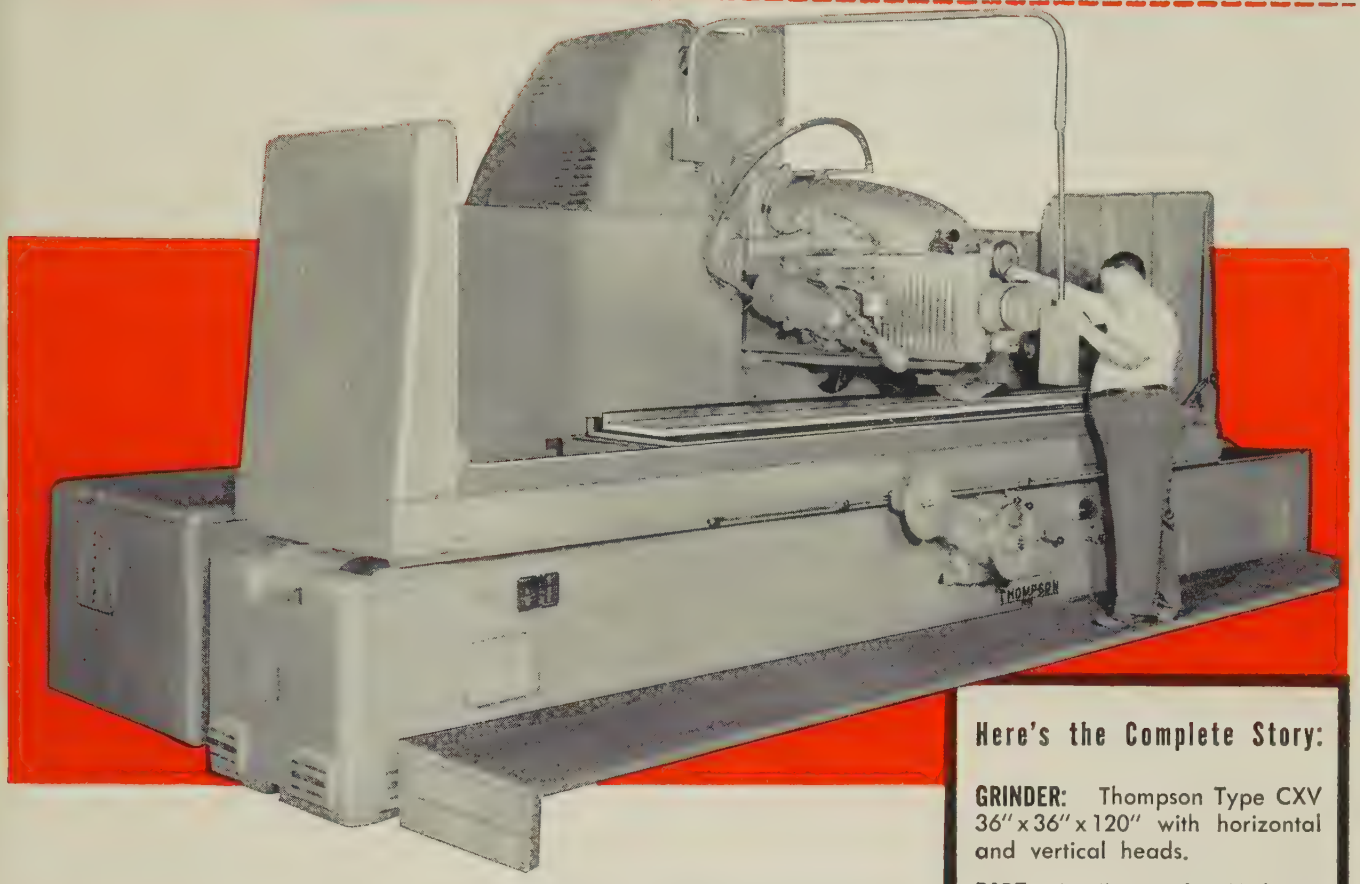
Stephen E. Platz was made assistant chief metallurgist, **Duraloy Co.**, Scottdale, Pa. He was with Carpenter Steel Co.

National-Standard Co. appointed **Louis R. Berner** manager of operations at its Niles, Mich., plant.

E. A. Correa, secretary and coun-

When large parts must be ground to total tolerances of .0005" or less . . . .

THOMPSON GRINDERS WITH THE NEW HYDRA-COOL HYDRAULIC SYSTEM SOLVE THE PROBLEM!



Machine ways up to 118" for The Michigan Tool Company's Roto-Flo Spline Rollers must be ground to .0005" total tolerance. Heat distortion, caused by hydraulic heat, became a critical problem in achieving this tolerance.

During the three months of operation since the installation of Thompson's new Hydra-Cool Hydraulic System*, these long ways are being ground to consistent .0003"-.0004" total tolerances. Heat distortion is eliminated. Scrap loss is reduced to zero. Grinding time is greatly reduced.

THOMPSON GRINDERS WITH THE NEW HYDRA-COOL HYDRAULIC SYSTEM MAY BE THE ECONOMICAL SOLUTION TO YOUR GRINDING PROBLEM. WRITE TODAY FOR FULL PARTICULARS.

Hydra-Cool also offers you these exclusive advantages:

- Heat damage to hydraulic seals, valves, controls and pump is eliminated.
- Break down of additive-type hydraulic oils is prevented—sludge will not form in the Hydra-Cool System.
- Lengthy warm-up periods are eliminated.
- Power costs are greatly reduced.

Hydra-Cool is standard on all Thompson surface grinders 40 inches and up in work length AT NO EXTRA COST.

Here's the Complete Story:

GRINDER: Thompson Type CXV 36" x 36" x 120" with horizontal and vertical heads.

PART: 118" way for Michigan Tool Co. Roto-Flo Spline Roller.

RATE OF TABLE TRAVEL: 100 ft./Min.

MATERIAL REMOVED: .065".

METAL: Flame hardened Ductile Iron.

WHEEL: 20x4x12 H Grade.

SCRAP LOSS: None.

GRINDING TIME: 3-4 hrs.

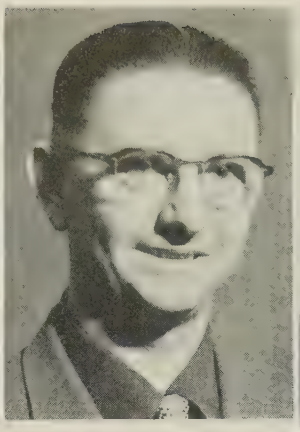
Thompson SURFACE GRINDERS

THE THOMPSON GRINDER CO., Springfield, Ohio, U. S. A.

"Keep THOMPSON in mind for that daily grind"

*Pat. Applied For

CHALMERS C. McELVAIN
Armco-Baltimore Works mgr.



HARRY C. KEMPER
LeBlond chief engineer

DENTON HASSELL
Carmet mgr., sales dist.

sel of **Armco Steel Corp.**, Middletown, Ohio, was elected a vice president.

Chalmers C. McElvain succeeds **G. D. Moomaw,** retired, as manager of the Baltimore Works of **Armco Steel Corp.** Mr. McElvain was made assistant manager in January.

Harry C. Kemper was appointed chief engineer, **R. K. LeBlond Machine Tool Co.**, Cincinnati. **Harold J. Siekmann,** vice president and chief engineer, has retired.

Rudolph Bachman was made chief engineer, instrument division, **Sterling Precision Corp.**, Flushing, N. Y.

John F. Dando was made general sales manager, **Ward LaFrance Truck Corp.**, Elmira, N. Y. **Benjamin W. Lewis** was named fire apparatus sales manager.

Donald A. Garr was made manager of engineering at the Westover, N. Y., plant of **General Electric Co.**

Sanson & Rowland Inc., Philadelphia, elected **Aaron I. Sanson III** president and treasurer; **Richard W. Goodby,** vice president-general manager; **James G. Pepper,** vice president-purchasing.

Felix T. Troilo was made sales manager, **Circuit Instruments Inc.**, St. Petersburg, Fla., subsidiary of International Resistance Co.

J. O. Cavanagh, former director of research and development, **Alloy Rods Co.**, York, Pa., was elected vice president-research.

Carmet Div., Allegheny Ludlum Steel Corp., Ferndale, Mich., appointed **Denton Hassell** manager of distributor sales.

Harry E. Connors was elected president of **Connors Steel Warehouse Inc.**, Pittsburgh. Formerly vice president, he succeeds his brother, **Norbert J. Connors,** who recently joined A. M. Byers Co.

Gilbert L. Olson was made chief metallurgist of the East Troy, Wis., plant of **Trent Tube Co.** He succeeds **R. K. Dickson,** recently made general manager of a new plant in Fullerton, Calif., which operates as a division of the home plant of Trent Tube, subsidiary of Crucible Steel Co. of America. **H. D. Kurtz** succeeds Mr. Olson as assistant chief metallurgist.

Fritz C. Hyde Jr. was made manager of New York district sales for **Revere Copper & Brass Inc.**, succeeding **William F. Otto,** who was made an assistant to the treasurer. **Daniel H. Sangster** was named sales manager, foil division, to succeed Mr. Hyde.

Frank Hadrick joined **Simpson Electric Co.**, Chicago, as chief field engineer-test equipment.

R. A. Ramsay joined **Mechanics Universal Joint Div.**, Borg-Warner Corp., Chicago, as sales manager. He was Detroit district manager, bearings division, Torrington Co.

Richard W. Summey, vice president-general manager of Noranda Copper & Brass Ltd., Montreal, Que., was named vice president-manufacturing for all plants of **Bridgeport Brass Co.**, Bridgeport, Conn. The Noranda facility is owned jointly by Bridgeport Brass and Noranda Mines Ltd.

American Steel & Wire Div., U. S. Steel Corp., Cleveland, appointed **Myron E. Capouch** assistant general manager-sales, and **Bruce D. Bennett,** manager-construction material product sales.

Herbert I. Chambers was made chief development engineer, **Consolidated Electrodynamics Corp.**, Pasadena, Calif.

Paul J. Roddy was made assistant general sales manager, **American Screw Co.**, Willimantic, Conn. He was eastern district sales manager for National Twist Drill & Tool Co.

George D. Leonard, metals procurement officer for **Chase Brass & Copper Co.**, Waterbury, Conn., assumes added duties, purchasing scrap metals for the Cleveland mill. **Charles L. Denehy,** production control manager, Chase Metal Works, transfers to the Cleveland mill as production control manager. He is succeeded by **Thomas M. Rianhard. Kenneth J. McNeill** succeeds Mr. Rianhard as superintendent of the sheet mill at Waterville, Conn.

OBITUARIES...

Robert E. Friend, 52, assistant general manager, Permaglas Div., **A. O. Smith Corp.**, Kankakee, Ill., died Sept. 20.

Max Friedman, president and founder, **Max Friedman Co.**, Cleveland, died Oct. 6.

Frank R. S. Kaplan, 71, chairman and chief executive officer, **Copperweld Steel Co.**, Pittsburgh, died Oct. 4.

Robert M. Shumway, 79, senior partner in **C. W. Shumway & Sons,** Batavia, Ill., died Sept. 29.

Walter F. Hinderer, 64, owner, **Kankakee Tool & Die Works,** Kankakee, Ill., died Sept. 28.

Loren C. Hurd, 52, president, **Metals Disintegrating Co. Inc.,** Elizabeth, N. J., died Sept. 29.

More Iron Powder

Alan Wood expects project to provide diversification into profitable new product line

ALAN WOOD Steel Co., Conshohocken, Pa., will build a plant at Ivy Rock, Pa., for the production of iron powder. It'll cost about $3.6 million, including $250,000 for a superconcentrate mill to be constructed at the firm's Scrub Oak Mine at Dover, N. J.

The Ivy Rock plant will have a daily capacity of 50 tons of iron powder produced by the "H" iron process, a development of Hydrocarbon Research Inc., New York. It will be built adjacent to the firm's open hearth department, meaning that the plant's hydrogen requirements can be supplied by the company's coke oven gas. National Cylinder Gas Co., Chicago, will construct the oxygen producing facility.

The iron powder will be suitable for many uses, including gear wheels and other small parts which are difficult to machine, coating of welding rods, flame cutting stainless steels and other alloys.

The nation's consumption of iron powder is on the increase. Last year, it was estimated at more than 32,000 tons. About one-third was imported from Sweden.

Sells Metal Forming Line

Struthers Wells Corp., Titusville, Pa., sold its interest in its tangent bender and related metal forming and work handling machinery to Taylor-Winfield Corp., Warren, Ohio. Struthers will expand production of its other products, including heavy forgings, boilers, and processing equipment for the chemical, food, and petroleum industries. Taylor-Winfield makes electric resistance and arc welding machinery and associated electronic control equipment.

New Firm Offers Flux

Vap-R-Flux Corp. has been organized at 198 Wayne St., Mansfield, Ohio, to produce a flame-flowed flux for brazing and welding. The flux is introduced directly into the fuel gas, eliminating the need for powdered flux or flux coated rod. Cal Walter is president; Ralph Raidy, vice president-sales.

Trane Expands in South

Trane Co., La Crosse, Wis., is building a $1.5-million plant at Clarksville, Tenn. The 125,000 sq-ft facility will make central-type air conditioning equipment. Construction is scheduled to be completed in January. The company has officially opened its $1.2-million engineering technical center and plant No. 4 at La Crosse.

Gets New Lease on Plant

Westinghouse Electric Corp., Pittsburgh, received an amended lease from the Navy Department for the huge naval industrial reserve aircraft plant in Kansas City which may lead to an increased production volume for the firm's Aviation Gas Turbine Div.

Los Angeles Firm Expands

H. A. Seele Corp., affiliate of Pacific Tool & Die Co., Los Angeles, has added a 5000 sq-ft building to its existing facilities for increased output of screw machine products.

Topp Mfg. Forms Division

Topp Mfg. Co., Los Angeles, a division of Topp Industries Inc., Beverly Hills, Calif., established a Communications Div. to concentrate on the design and manufacture of communication and navigation devices for aircraft and commercial ground station traffic control equipment.

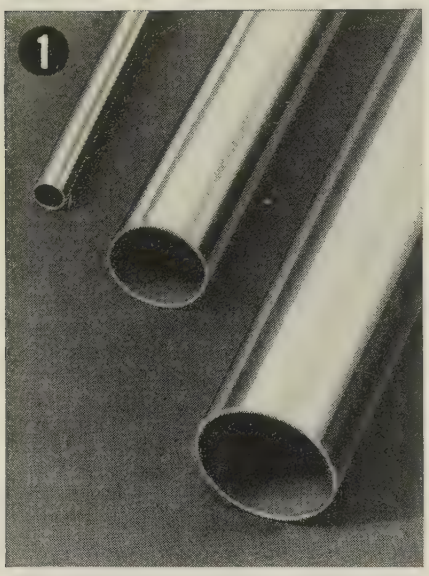
Expands Research Center

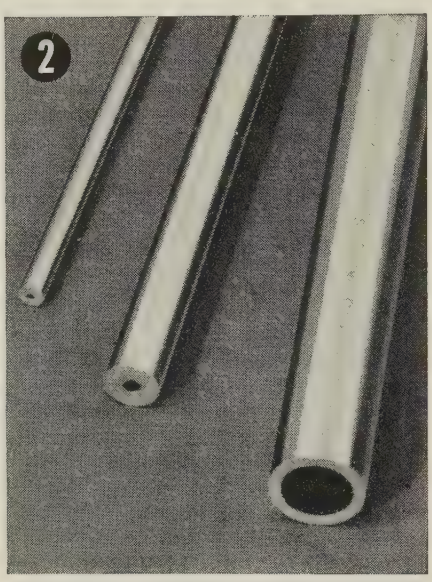
Stanford Research Institute, Menlo Park, Calif., is expanding its metallurgical laboratory. New testing facilities include tensile and creep-rupture equipment. Process equipment includes a vacuum induction and a consumable electrode, cold mold melting furnace. A forging hammer and rolling mill have been installed, and facilities for metallography and electrochemistry are complete. Equip-

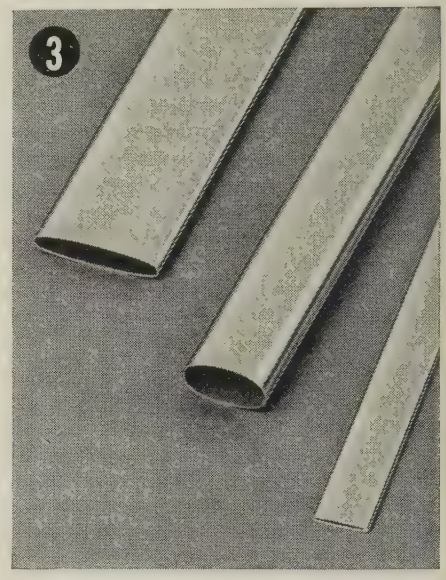
(*Please turn to Page* 96)

TUBEXPERIENCE IN ACTION

TO MEET YOUR NEEDS Superior application...UNUSUALLY WIDE







Take advantage of Superior's unequalled variety of instrument tubing. Now you can select tubing from a wide choice of analyses (over 120), sizes, shapes, and mechanical properties. All tubing is produced to extremely close tolerances, finished with bright, clean, uniform surfaces.

1 Mechanical Tubing—Instrument Line

Produced in both seamless and Weldrawn forms, generally to meet such requirements as special OD-ID or ID-wall limits; special analysis or heat selection; controlled mechanical properties; and special finishes. Extra-long straight or coiled lengths or specific cut or multiple lengths. Cut and multiple lengths up to 39 ft. maximum. Coil lengths up to 500 ft., depending on material and size desired.

2 Pressure and Super Pressure Tubing

Made from specially selected raw materials which have had inside surfaces conditioned to remove fissures and other defects. Produced in stainless, carbon and alloy steels to carry pressures as high as 100,000 psi. Finished tubing must meet special inspection standards. Super pressure tubing is available in single wall, which will give long reliable service at lower working pressures, or in composite wall to withstand higher pressures. Used in hydrogenation process equipment and high pressure autoclaves.

3 Bourdon Tubing

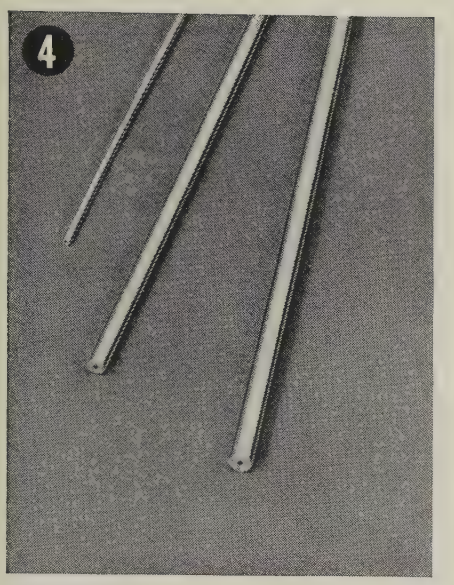
Superior's wide range of alloys and sizes makes it possible to satisfy any set of service conditions—such as high strength, low hysteresis, corrosion resistance, etc.—for Bourdon tubing in indicating and recording instruments. Many different analyses to choose from, including Ni-Span C. Helix and spiral as well as "C" tube elements are fabricated from the many analyses which Superior offers. Smooth, clean surfaces, close dimension control, freedom from decarburization, accurate shaping and cleanliness, all combine to produce Bourdon tubing of unexcelled quality.

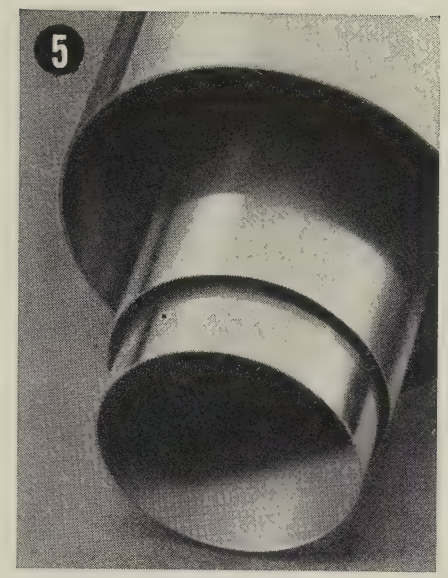
4 Capillary Tubing

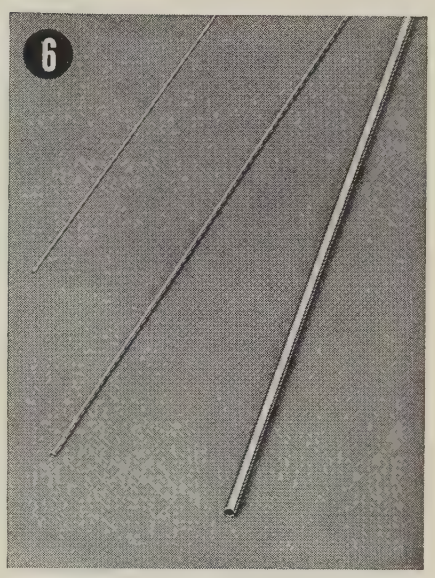
Superior capillary tubing is used for transmitting temperature and pressure impulses from the source to a recording or indicating instrument. Any outside diameter can be produced up to and including 3/16 in. OD. IDs range from .004 in. minimum to .080 in. maximum. Has smooth ID, extreme ID uniformity, excellent corrosion resistance, and is easy to weld, braze or solder. Types 304, 316, 321, 347 and 446 stainless, Monel, Inconel, nickel

produces 6 types of tubing for any instrument

RANGE OF SIZES AND ALLOYS







and carbon are recommended analyses. Can be produced in straight lengths or long coils.

5 Large OD Thin Wall Tubing

In sizes to 2½ in. OD, large diameter thin-wall tubing is available in Types 304, 321 and 347 stainless steel. In other stainless analyses the limit is 1⅛ in. OD. It is also available in 16 additional ferrous and nonferrous analyses. Is easily fabricated and has been used in such applications as bellows, flexible metal hose, and instrument casings. Available in both seamless and Weldrawn® (welded and drawn) forms. In a variety of tempers.

6 Needle Tubing

For years Superior has made the finest stainless steel hypodermic needle tubing available. Originally developed to provide free, sterile passage for fluids, this tubing is now used for a wide variety of industrial applications such as tips and fountain parts in continuous inking equipment, nozzles for the application of lubricants, for dispensing minute, accurate quantities of liquids in microchemical work. The high strength, stiffness and strict dimensional tolerances of this tubing make it ideal for instrument application.

Your nearest Superior warehouse distributor can help you with any tubing problems—may often offer money-saving recommendations. If you do not know the name of the Superior warehouse distributor for your area, tell us to furnish you with it.

For a free copy of Bulletin 40—"A Guide to the Selection and Application of Superior Tubing"—write Superior Tube Company, 2005 Germantown Ave., Norristown, Pa.

Superior Tube

The big name in small tubing

NORRISTOWN, PA.

All analyses .010 in. to ⅛ in. OD—certain analyses in light walls up to 2½ in. OD

West Coast: Pacific Tube Company, 5710 Smithway St., Los Angeles 22, Calif. RAymond 3-1331

(*Concluded from Page* 93)

ment for pressing and sintering refractory metal powders is on order.

CF&I Orders Two Furnaces

Colorado Fuel & Iron Corp.'s Wickwire Spencer Steel Div., Buffalo, awarded contracts to the Gas Machinery Co., Cleveland, for two, 40 ft, radiant tube, gas fired wire patenting furnaces. Each will have a 20-ft lead quench tank. One will be installed at Palmer, Mass.; the other, at Buffalo.

Offers Larger Steel Drum

Vulcan Containers Inc., Bellwood, Ill., expanded its manufacturing activities to include mass production of 55-gallon steel drums.

Haskell Building Plant

Haskell of Pittsburgh, maker of steel office furniture, is building a factory and executive offices at East Oakmont, Pa. The building is scheduled for production by May 1, 1958.

ASSOCIATIONS

Clifford V. Coons, executive vice president of Rheem Mfg. Co., New York, was elected a director of **American Gas Association,** New York. New officers are: President, R. W. Otto, Laclede Gas Co., St. Louis; first vice president, A. W. Conover, Equitable Gas Co., Pittsburgh; second vice president, J. T. Wolfe, Baltimore Gas & Electric Co.; treasurer, V. T. Miles, Long Island Lighting Co., Mineola, N. Y.

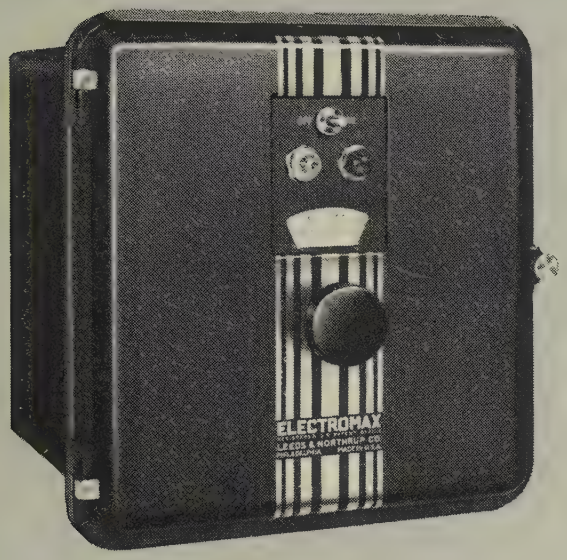
Marshall F. Allen has been appointed executive vice president of the **Air Moving & Conditioning Association Inc.,** Detroit.

NEW PLANTS

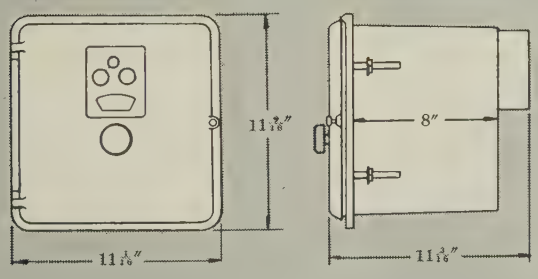
Ellstrom Inc., an affiliate of Dearborn Gage Co., Dearborn, Mich., is constructing an 18,000 sq-ft plant at Garden City, Mich. The building is designed with minimum

NEW

Thermocouple Electromax® Controller for temperatures up to 3200 F



Design simplicity minimizes maintenance; sturdy components resist normal shock and vibration. Precisely calibrated slidewire and circuit resistors hold stability. For easy servicing, amplifier slides out of case; standard vacuum tubes are used . . . their replacement requires no special selection.



Compact Electromax controller mounts flush in panel. Leads are brought to terminal board located on back of case. Net weight about 27 pounds.

- **0.3% LIMIT OF ERROR**
- **10 μV* CONTROL DEAD BAND**
- **CONTINUOUS STANDARDIZATION**
- **4-WEEK DELIVERY**

**0.5 F for base metal thermocouples; approximately 1.5 F for platinum thermocouples.*

Combining all the accuracy and reliability of a modified d-c potentiometer with a drift-free amplifier detector, this new Electromax signalling controller provides low-cost electronic two-position control where a record or continuous indication is not required. It's ideal for many electric and fuel-fired furnaces, ovens, plastic extruding machines, and some types of chemical processing units. Other uses include zone control on continuous ovens and kilns, and excess (overheat) temperature cutout control.

This compact signalling controller has only two moving parts—a plug-in relay and converter (chopper). These, together with simple circuitry and liberal use of plug-in components (including a plug-in amplifier), minimize maintenance and reduce initial cost. To speed start up of your process, Electromax is delivered four weeks after receipt of your order.

Other standard features include both thermocouple and amplifier fail-safe, and automatic reference junction compensation. Amber and red signal lights indicate whether process temperature is above or below set point.

For additional information on the thermocouple Electromax, call your nearest L&N office or write 4957 Stenton Ave., Philadelphia 44, Pa. Ask for Preliminary Data Sheet ND47-33(1).

LEEDS NORTHRUP
Instruments
Automatic Controls • Furnaces

window area to permit complete air conditioning and temperature control required for research, development, and manufacture of the firm's expanding line of gaging fixtures.

Revere Copper & Brass Inc., New York, opened a redistribution center at 3615 Olive St., St. Louis, Mo. Products to be stocked include Revere copper water tube and Revere Dryseal copper tube.

CONSOLIDATIONS

Toledo Scale Co. and **Haughton Elevator Co.**, both of Toledo, Ohio, will merge, subject to approval by shareholders. The principals would become operating divisions of Toledo Scale Corp. with these officers: President, Harris McIntosh; executive vice president, J. P. Bernard; vice president, J. A. Brubaker; and secretary-treasurer, F. K. Billet.

Napco Industries of Minneapolis purchased **Detroit Bevel Gear Co.**, a subsidiary of Gear Grinding Machine Co., Detroit. Detroit Bevel has a 250,000 sq-ft plant and some 400 gear-cutting and grinding machines.

Parker Appliance Co., Cleveland, consummated its purchase of **Hannifin Corp.**, Des Plaines, Ill. Stockholders also have approved changing the name of the company to Parker-Hannifin Corp. Elwood G. Peterson, president of Hannifin, has been elected a vice president and director of Parker-Hannifin.

Pfaudler Co., Rochester, N. Y., and **Permutit Co.**, New York, have merged under the name of Pfaudler Permutit Inc. Officers of the consolidated firm are: Chairman, H. W. Foulds; vice chairman, Ranlet Miner; president, Mercer Brugler; and executive vice president, D. A. Gaudion. Pfaudler makes high speed, precision machinery and glassed steel processing equipment; Permutit, water conditioning equipment, ion exchangers, and powerplant accessories.

Ogden Corp., New York, acquired the **Eimco Corp.** and **American Foundry & Machine Co.**, both of

Salt Lake City, Utah. Eimco makes overhead loading and excavating equipment, and filtration equipment. American Foundry is a producer of gray iron and steel castings.

Victoreen Instrument Co., Cleveland, purchased **Jordan Electronics Inc.**, Alhambra, Calif., maker of nuclear radiation instruments, area monitoring systems, and industrial radiation detection equipment. Victoreen manufactures radiation measuring instruments, reactor control systems, and electronic components.

Merger of **Liquid Carbonic Corp.**, Chicago, into **General Dynamics Corp.**, New York, has been approved by shareholders. Rex L. Nicholson, president of Liquid Carbonic, becomes senior vice president of General Dynamics and president of the Liquid Carbonic Div.

NEW ADDRESSES

Super Oil Seal Mfg. Co. Ltd. and **Chicago Rawhide Mfg. Co. of Canada Ltd.** moved to their new plant and offices at Park Road and Henry Street, Brantford, Ont.

Babcock & Wilcox Co.'s Refractories Div., New York, moved its Augusta, Ga., district sales office to 725-31 Broad St., that city.

NEW OFFICES

Olin Mathieson Chemical Corp., New York, opened a New England sales office for Olin Aluminum at 49 Waltham St., Lexington, Mass. The office will be managed by Robert W. Pierce.

American Metal Co. Ltd., New York, opened a new Detroit office in the Penobscot Bldg., Detroit, under the management of Charles Nagler. The office will be responsible for the sale of all products offered by the firm as well as the purchase of nonferrous scrap. Sheldon Tauben has been appointed manager of the firm's Boston office which will be responsible for the purchase of nonferrous scrap.

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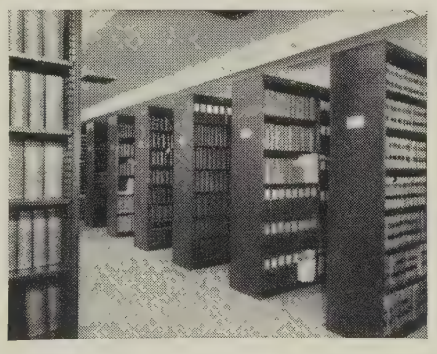

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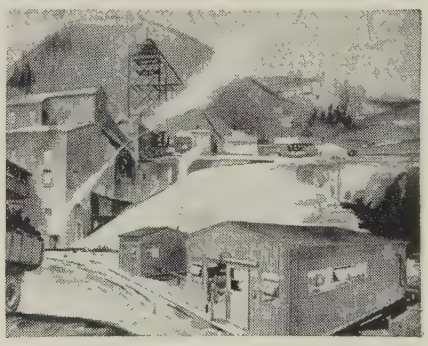

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Small Business: Its Place in Our Future

Is small business being strangled? Some politicians (and small businessmen) make that claim, yet the facts show that more small businesses operate today than ever before.

But the small businessman does have special problems—inadequate research and development, financing difficulties, shortages of skilled management personnel, insufficient marketing knowledge.

For help, Mr. Small Businessman, read STEEL's tenth and last article in its 1957 Program for Management (coming Nov. 11). It will tell how research and marketing information is readily available, how financing and personnel problems can be solved.

Articles published to date:

1. **The Care and Feeding of the Junior Executive**
   (Feb. 11, Page 93)
2. **Grooming Middle Managers**
   (Mar. 18, Page 93)
3. **Profit Sharing**
   (Apr. 15, Page 115)
4. **Inventory Management**
   (May 13, Page 109)
5. **Managing Our Markets**
   (June 17, Page 93)
6. **Research: Threshold to the Future**
   (July 15, Page 93)
7. **Producing for the New Technology**
   (Aug. 12, Page 113)
8. **Dealing with Workers**
   (Sept. 16, Page 119)
9. **Make or Buy?**
   (Oct. 14, Page 105)

Extra personal copies of these Program for Management articles are available until the supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

MAKE or BUY

. . . here's how you can find the answer

YOU'LL find the key to the make or buy puzzle if you prepare each case with the care of a husband trying to talk his wife out of a do-it-yourself proposal. Regardless of the "decision," you'll know where the booby traps are.

Each route has a complex of "hidden" costs that can wipe out profits on any job.

Here's a little quiz that should bring the point home:

Before you decide to make. . .

1. Do you figure on a higher-than-normal reject rate at the beginning of the production run?

2. Do you find out if your purchasing people have the contacts and knowhow to buy for the product?

Before you decide to buy. . .

1. Do you fix the responsibility for extra transportation costs in the event you need more parts in a hurry?

2. Do you determine whether it will be cheaper for you or the vendor to buy materials?

Not Easy—Count yourself in the majority if your score is short of perfect. By nature, the problem boils down to a myriad of easy-to-forget details. But the task is greatly simplified if you have an organized plan of attack such as this article sets forth.

The place to start is revealed in this statement by Daniel C. McCarthy Jr., director, manufacturing planning office, Chrysler Corp.'s manufacturing staff:

"There probably are two phases to the make or buy decision. One is a straight cost analysis which usually affects only small parts. The majority decisions include more intangible factors which can make the big difference between profit and loss."

Whether you're a prime contractor or a supplier, it means you must consider all the angles in:

Direct costs.

Indirect costs.

Noncost factors.

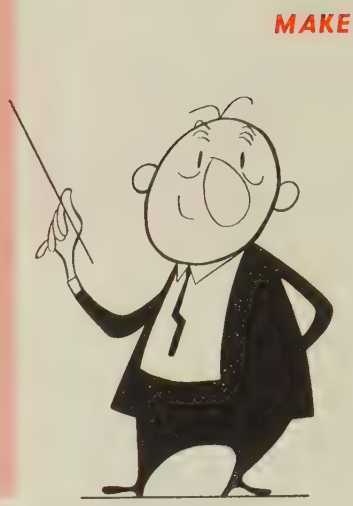
Direct Cost Intangibles

You usually can measure these factors in dollars and cents. They chiefly concern labor, materials, transportation, and overhead.

The do-it-yourselfer figures how

Before You Decide . . .
Consider These Factors

- Price.
- Delivery.
- Quality.
- Investment in tools and equipment.
- Future flexibility.
- Capacities of potential plant.
- Fluctuations in employment levels.
- Effect on overhead.
- Vendor relations and effect on new developments.
- Ease of liaison with development engineering.
- Attitude of vendor management.
- Engineering assistance provided by captive or vendor.
- Engineering assistance required by producing captive or vendor.
- Ability to procure raw materials, purchased parts, or components.
- Security considerations.



Source: Burroughs Corp.

much to pay for boards, nails, glue, and paint. But he forgets to include the cost of driving to the mill for special lumber.

Few firms make such elementary mistakes in doing a cost analysis. But each area has its share of intangibles which are sometimes overlooked.

1. Materials

L. B. Miles, manager of General Electric's value analysis unit (Materials & Purchasing Dept., Schenectady, N. Y.) says:

"We think one thing must be held inviolate in today's competitive market. The cost of parts, components, and materials which go into our products must not be higher than what our competitors would pay for them."

It means you should ask questions like this: Who has the best chance of getting materials if a shortage develops—you or the vendor?

C. C. Caditz, president, Northern Metals Products Co., Franklin Park, Ill., and a student of make or buy, emphasizes that many stamping plants buy large quantities of steel at mill prices. If you decide to make a part, can you buy from the mill, too? If so, will the added costs of inventory make it worthwhile?

It's particularly difficult to determine prices of raw materials. Your purchasing department probably has forecast how supply and demand will affect raw material prices for six months or a year. But what if you plan on making the part for five years? What if you might have to make it from some other material later on?

No company can ignore the possible costs of carrying a large enough inventory to last through a material shortage. Another consideration: Defense stockpiles or a strike could curtail your flow of materials.

2. Labor

The do-it-yourselfer invariably ignores the time he spends on a project. He's more interested in what the finished job looks like or how it works. Some companies make mistakes that are less obvious but far more costly.

One firm STEEL quizzed decided to make a close tolerance part that required skilled labor. It estimated wages of extra help on the basis of its average hourly wage rate which included 40 per cent unskilled workers. The mistake lost the outfit a quarter million dollars in six months.

Take Care—Mr. Caditz warns it's the obvious that's often overlooked.

"It's always wise to see the kinds of men you'll need, find out if they're available, and determine how much you'll have to pay them," he admonishes. His advice is particularly important if the operation involves moving into a new area, building a new plant, or hiring men who never have done the kind of work involved.

How much a man produces depends on how fast he has to work. Figure labor productivity at different operating rates to see how it may affect your decision. And always determine what the unit labor cost will be under normal conditions.

Unions—Sometimes a new plant stands idle while rival unions battle to see who will represent the workers. Before hiring, particularly if the men belong to a craft you're not familiar with, find out what their status is as far as the

union is concerned. If it looks like organizational troubles are in the wind, it might be wise to buy instead of make.

3. Transportation

Shipping costs are reasonably simple to figure, but here is a tip that can prevent friction between suppliers and purchasers:

Before signing a contract, determine who will pay for the return of rejects.

Another Tip—Yale & Towne Mfg. Co., Stamford, Conn., is closing its Stamford foundry because shipping costs make it too expensive to cast its own lock parts.

The firm provided castings for 17 divisional plants scattered all over the country. Now each division will buy from a nearby supplier. Besides saving on transportation, Yale & Towne figures the competition between job shops for a division's business should shave costs even more.

4. Overhead

Stewart-Warner Corp., Chicago, adds a variance factor to costs to cover rejects, scrap losses, and unforeseen problems.

E. N. Osterberg, director of purchases for S-W's Alemite & Instrument Div., says: "Too often when you want to make a part you tend to ignore the variance factor. That's why actual costs often are higher than they appear."

Another Pitfall—Many a manufacturer says: "We can forget fixed costs if we make this part; they're already covered by other departments."

It may be true if the job is temporary or doesn't require extra men or equipment.

But such thinking disregards what Robert L. Dixon, professor of accounting, University of Michigan, calls *creep*.

"Fixed costs cannot be ignored in making the make or buy decision unless one is to be satisfied with a shortsighted analysis. Even though there may be no immediate addition to fixed costs, they inevitably will creep into the total cost picture," he explains.

Overload — "A side effect of *creep* is to unconsciously compensate for overloads which result from piecemeal additions of bargain activities," warns Mr. Dixon.

Oveloading affects equipment, materials, and men.

Example—E. W. Franz, vice president, May-Fran Engineering Inc., Cleveland, tells about a job his firm farmed out to a subcontractor.

"We wanted to be assured of good quality so we told one of our supervisors to drop in on the job every so often. We forgot to add some of his salary to the total cost of that part. We figured he still was working for us, so

When It Pays To Make

Holley Carburetor Co.'s Detroit aircraft division has been facing layoffs and idle capacity because of the slump in defense orders.

The division has set up a six-man make or buy committee to review contracts which were farmed out when the firm didn't have time or space to bother with small parts.

"Now we believe we can produce more than half the parts we buy and can cut our costs in half by doing so," says Nicholas Dann, director of purchases.

How It Works

The stainless steel piston pictured below goes in the fuel control system of a jet engine.

Holley started making the part in 1947, but farmed it out when business boomed. Cost to buy: $15.25.

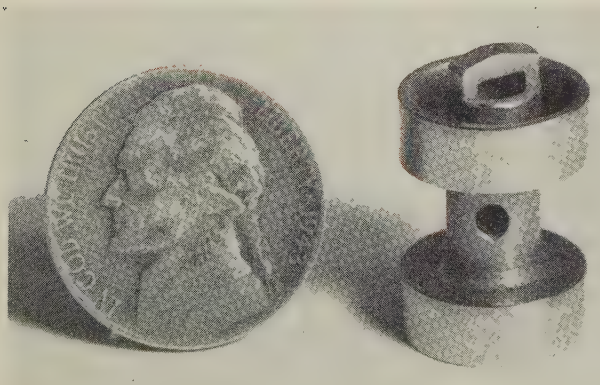
Here's what the make or buy committee found when it re-evaluated the job:

1. **The piston now is used for replacement and repair. Orders run about 100 a month on an indefinite basis.**

2. **The jobber used skilled labor and hand methods to maintain tolerances. Holley has idle equipment which can do the work with semiskilled labor.**

3. **The division could use a variable burden rate in figuring costs because it already had idle men and equipment to make the part. It costs Holley $8.27 to make each piston.**

MAKE OR BUY?



we didn't have to worry about who paid him."

Actually, May-Fran discovered the supervisor had to spend more time at the subcontractor's plant than at his own. His primary job suffered, and resulting losses were greater than any savings that were realized on the subcontracted part.

When To Use—Mr. Caditz thinks it's important to add fixed costs when figuring:

- Long range projects.
- New products.
- Products that require capital expenditures.

When To Skip—He feels they usually can be left out:

- When figuring short range projects.
- When no extra facilities or men are needed.
- When a job fills idle capacity.

"If you're bidding against a supplier, always add an honest profit to your bid; otherwise, you're just kidding when you say you can save by making it yourself," he warns.

Indirect Cost Intangibles

These factors cannot easily be measured in dollars and cents, but failure to apply them results in higher costs which can be easily measured.

When the do-it-yourselfer works late in his home workshop, he's apt to miss the bus in the morning. Tardiness could cost him his job. It's an indirect cost he forgets.

Most of these costs center on people (workers and management) in your plants and in the plants of your suppliers.

Several Sources—A common indirect cost factor stems from competition, says Mr. McCarthy. "We find divisions cut costs to compete with each other so they'll look good to top management. Division managers forget somebody else in the corporation has to make up the difference between their estimates and actual costs."

It has been pointed out that incorrect allocation of a supervisor's time can make it hard to find out where losses occur. Your vendor's management bears watching, too.

"If the management of a company changes, it may mean the ability of that plant to produce a quality part on time is affected," say Mr. McCarthy.

Look ahead for possible weak spots in the management line-up. How will they affect the ultimate cost of your decisions?

1. Capital

When a decision to make involves capital expenditures, indirect costs can climb rapidly.

The questions that concern buying of materials apply here. Consider: Is it wise to make heavy capital investments when your cost picture can change drastically in five years?

MAKE OR BUY?

When It Pays To Buy Then Make

Sometimes a prime contractor can make an agreement with a supplier which will profit both parties.

Until 1949, Burroughs Corp., Detroit, filled in letters and numbers on key tops for office machines by hand. Quality was poor; costs were high. Business was booming and additional millions of key tops were needed. Burroughs decided it wanted a better key top for lower cost.

To purchase most of these items meant losing control of parts which were vital to production of nearly all its products. Basic company policy dictated that it make as many of its own parts as possible.

Here's what happened:

Burroughs found that Electric Mfg. Co., San Francisco, supplier to other office equipment manufacturers, could make a better key top. The company contracted with Electric to make the part for all its new models, with the cost of dies included.

After operating for several years on that basis, Burroughs negotiated with the San Francisco firm to build it two of the machines. They went into service two years ago. Burroughs is now making most of its key tops. The machines paid for themselves in a year.

For Electric Mfg., facilities were freed for more profitable business in other plastic products.

Here's How—S. P. Lynn, plant engineer for Holley Carburetor's aircraft division, says its make or buy committee follows this practice:

"We look for several parts now being purchased that could be made at a saving if we bought only one machine. Management usually justifies a purchase like that."

Noncost Factors

These factors seldom can be specifically measured. Failure to apply them eventually shows up in lower profits. They include such things as changes in technology and protection of competitive products, quality, and delivery.

The do-it-yourselfer often forgets that his wife won't look too kindly on the mess he's making. The dire consequences that follow don't have a thing to do with real costs, but they might make the do-it-yourselfer decide that the whole venture has been highly unprofitable. Companies face a comparable situation.

If, for example, the decision calls for adding men to the staff, there will be problems of adjustment and of seniority that have nothing to do with wage rates or workmen's compensation.

Yet such intangibles can have a strong influence on a plant's productivity. Smart managers look in their own shops to forecast labor problems. Really smart managers also look in vendors' plants to see if the vendor is in for a long period of labor peace. Such forecasting certainly should enter into a make or buy decision, thinks Chrysler's Mr. McCarthy.

Another Facet—Say a company builds a plant or acquires facilities to make a part, and other suppliers come up with a cheaper way of making it. The prime contractor has to scrap much of what he's done to stay competitive.

One of the auto companies is considering modern welding equipment for a radiator plant. The equipment will cost about $4.6 million; yet there's a strong possibility advances in ultrasonic welding may obsolete the equipment within five years.

The question is: Will the equipment pay for itself before it has to be scrapped?

Don Workman, executive vice president, Gray Iron Founders' Society, Cleveland, suggests: "Because suppliers compete so fiercely with each other for business, they are more likely to come up with new techniques and methods which will cut costs."

The moral: In any field where technology changes rapidly, it might be better to buy from an experienced supplier.

When It No Longer Pays To Buy

Many times a firm drops a supplier cold and finds itself in an embarrassing situation when it has to go back to him.

You stand a better chance of being greeted with a smile on your return if you tell suppliers what you're doing and why.

Stewart-Warner Corp., Chicago, had been buying the inner core wires of speedometer driveshafts. Stiff competition was bringing prices down, costs up. S-W might have continued to buy the cores, but its purchasing department heard of a small firm that was going out of business and leaving behind some excellent coremaking machinery.

After checking all the angles, the company found it could buy the equipment and make its own cores for less than it was paying the vendor.

Before making any move, S-W went to the supplier and told him its decision.

S-W also guaranteed the supplier a percentage of its business for a couple of years while he built up new contacts.

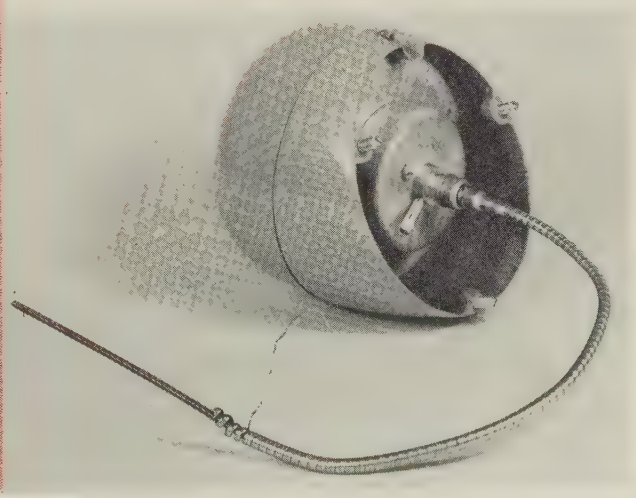
Top management handled the whole deal so the supplier didn't feel he was being discarded without a second thought.

According to E. N. Osterberg, director of purchases, Alemite & Instrument Div.: "We remained competitive, but if we ever have to go back to this vendor, we know we'll be welcome."

1. Protection

No automaker would dream of farming out panel dies or functional part tooling which might

MAKE OR BUY?



When It Pays To Buy

The make or buy question is answered nine times out of ten on the basis of cost. Failure to know and hold costs has kept many potential suppliers from pricing realistically and from getting bids. Recognizing that, the Gray Iron Founders' Society, Cleveland, has started a program to help its members know costs better.

It has already helped gray iron job shops to keep costs—and prices—under those of captive operations.

Other associations, whose members lose jobs to captive operations because of noncompetitive costs, might try a similar system. Here's how GIFS works:

- **There are 17 GIFS foundry centers, each with a local cost group composed of member firms.**
- **All members use a basic cost system developed for GIFS.**
- **Each quarter, members (identified by symbol only) get comparative cost breakdowns of all foundries in that GIFS group.**
- **Trained GIFS cost consultants assist foundries whose costs are out of line in relationship to those of competitors. Consultants take into account the peculiarities of each foundry's operation.**

GIFS Basic Cost System

PRODUCTION COSTS*	OVERHEAD COSTS†	SPECIAL HANDLING COSTS
Melting	Power & Light	Returns & Allowances
Molding	Depreciation: Equipment, Building	Freight & Express
Coring	Taxes	Special Alloys
Cleaning & Shipping	Insurance	Annealing
	Heat	Extra Work
	General Repairs	
	General Supervision	
	Payroll Taxes	

*These are general categories. Standard forms allow shops to break down costs in each group.
†Incomplete listing.

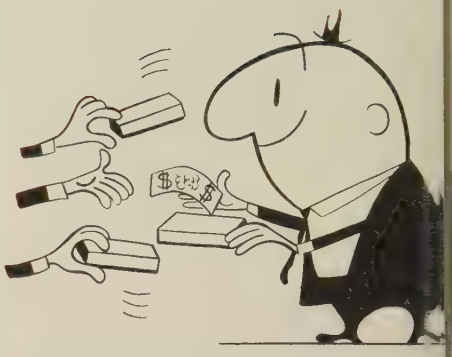
tip off competitors to long range plans.

If secrecy is of prime importance, it's almost always better to do it yourself.

The desire to protect quality may turn the balance in favor of buying. Vendors who specialize in one product usually have the knowhow needed to make better parts than the firm that suddenly decides it wants to get into the act.

But sometimes a vendor doesn't care whether he makes the part. Asks Mr. McCarthy: "Does the supplier really want to make the part, or is it just a low profit item which he throws in to fill up capacity? If it's a challenge to him, if he really wants to produce it, the prime contractor seldom has to worry about quality or delivery."

Another Type — Mr. McCarthy adds that the split contract offers protection because it lets the prime



contractor compare vendor and captive costs quickly and accurately.

Such contracts also pay off when sudden changes in demand develop or when material or labor shortages curtail production in captive or supplier plants.

A Good Question—Protection can get pretty academic if you lose sight of the basic question: Are you protecting your profits?

Mr. Workman reports that in the last ten years more than 800 gray iron jobbing foundries have been forced to close because of captive competition.

It may seem like a potent argument for making a product, but Mr. Workman suspects that many captive operations are not truly profitable. He says they're maintained out of necessity and possibly because top management refuses to admit it has made a mistake.

Mr. McCarthy agrees: "It's the toughest thing in the world to look at a part and say: 'That's the way we're doing it, but you know, it's really not the best way.'"

Here are some reasons why Mr. Workman believes the jobber can

often do a better job than a captive shop:

- They can balance workloads against seasonal slumps. Captives often sit idle or spread work out which ties up inventory.
- To stay competitive, a jobber has to keep costs down. The captive often lets overhead and inventory costs be absorbed by other divisions.
- Jobbers seldom face multiple union problems. They often have lower wage rates than captives that usually have to meet the wage level set by the parent company.
- Captives seldom bother to design out costs. Jobbers can't afford to stop looking for cost cutting methods.

A Gray Iron Founders' Society survey shows 74 per cent of the prime contractors for castings don't know enough about the foundry business to really anticipate all its problems.

How To Decide

Here are two steps you can take to make sure you investigate all the intangibles of direct, indirect, and noncost factors: Set up a committee. Make a checklist.

Committees—Holley Carburetor's make or buy committee (see exhibit, Page 107) is good for medium sized plants.

In smaller firms, the decision usually is the responsibility of one company officer. Larger outfits may do better if they set up a committee like General Electric does.

GE Plan — Each plant has a standing committee of persons from purchasing, finance, and production. It makes continuing studies on all parts having an annual volume of more than $50,000.

GE's philosophy: The fewer parts it has to make the more money it can save. The company has 35,000 vendors and 17,000 subcontractors.

Chrysler—This automaker is developing a sourcing system to establish make or buy rules for parts. It isn't revealing details, but most sourcing setups include these categories:

Parts which always are made for reasons of security, quality, or delivery; parts which always are bought because the supplier is more experienced or has the proper facilities; parts which may be made or bought (sometimes both). This is usually the largest category.

Burroughs — This firm's checklist (see exhibit, Page 108) works for almost any size operation.

Remember: No matter who uses a checklist, someone has to be responsible for the final decision. At Holley Carburetor, for example, decisions calling for new capital equipment are made by top management. Decisions on other parts are made by the make or buy committee, subject to top management approval.

Word to Wise—Cautions Mr. Caditz: "Sometimes companies get so involved with formulas, committee systems, and studies to find out how much they'll save . . . that the procedure itself costs more than they save no matter which way they decide."

How To Implement Decisions

In making a decision remember to:

1. Select vendors.
2. Help vendors.
3. Scrutinize captives.

1. Selection

Most companies have some method of picking suppliers and subcontractors. Usually, they develop approved lists of vendors qualified to make certain parts.

Since price, quality, and delivery are primary, firms seeking good suppliers might do well to follow Mr. McCarthy's rules (see Page 112). Add to these the intangibles already discussed, and venod selec-

Assuring Vendors' Reliability

Hughes Aircraft Co., Culver City, Calif., says companies that thrive on defense contracts must insure quality.

Like most defense contractors, Hughes participates in a vendor certification program.

Here's why Hughes says it can maintain reliability:

- **We survey our suppliers' operations.**
- **We select and qualify all parts.**
- **We ask suppliers to certify the quality of their parts.**
- **We ask suppliers to make reliability assurance tests.**
- **We're careful in rating suppliers.**

MAKE OR BUY?

How To Live With Your Vendor

Prime contractors complain about supplier problems, but fail to realize they sometimes bring them on themselves.

Daniel C. McCarthy Jr., director, manufacturing planning office, Chrysler Corp.'s manufacturing staff, offers these rules for a happier relationship:

The Buyer Should . . .	The Supplier Should . . .
• Never offer jobs which he suspects the vendor can't produce without running into trouble.	• Never take a job unless he's sure he can deliver without adding men or facilities.
• Set realistic quality standards.	• Meet realistic quality standards.
• Set realistic delivery schedules.	• Meet realistic delivery schedules.
• Give the vendor the desire to produce satisfactory parts.	• Avoid keeping the prime contractor in short supply.
• Give the vendor drawings which are as detailed as possible.	• Avoid depending on added costs of engineering changes to pad out low initial quotes.

Says Mr. McCarthy: "If vendors and purchasers would get these problems ironed out before they sign a contract, both sides would eliminate 80 per cent of their future headaches."

tion becomes less like guesswork.

2. Helping

Howard Maynard, president, Snyder Tool & Engineering Co., Detroit, offers these ideas for helping a vendor produce the results you want:

Develop and educate a practical number of dependable subcontractors.

Help them in any way possible if trouble develops, no matter whose fault it may be.

Warn them well in advance of any business change that may affect their contracts with you.

Discovery Process — Suppliers seeking business and prime contractors seeking good suppliers might drop in at their bank. Messrs. Maynard and Caditz emphasize that bankers can act as clearing houses for clients whose business they want to keep.

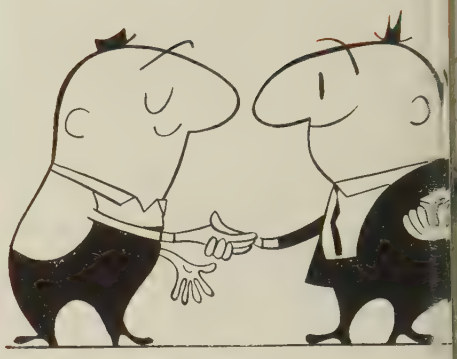
"If a company is in trouble, nine times out of ten the bank will suggest one of its customers who can give advice," says Mr. Maynard.

"We get many of our best jobs through customers originally referred to us by our bank," adds Mr. Caditz.

Supply Officers — Ford and Chrysler are typical of larger firms that have appointed directors of supplier relations. Their job is to help vendors by acting as mediators, giving information, and offering technical aid.

J. C. Poyner, Chrysler's recently appointed director of supplier relations, explains: "A supplier has to make money to be a good supplier. It's to our benefit to help him."

MAKE OR BUY?



3. Scrutinizing

If you decide to make in a captive plant, here are some cost areas to investigate:

How does the captive shop allocate costs of inventory and material handling?

Does the captive pay for all its own engineering and design, or does it depend on the parent engineering staff for free help?

Does the management of the captive shop feel it must get contracts at any price to prove it's useful to the firm?

Is rivalry between captives in a company so strong it might result in cutting costs below realistic levels?

How To Follow Up Decisions

After considering all the obvious and intangible factors, a company still must do two things:

Tell all parties affected by the decision as soon as possible.

Make some provision for an alternate course of action in case it has to later reverse the decision.

Finally, the informed do-it-yourselfer would probably advise: "Don't be penny wise and pound foolish!"

Technical Outlook

LONGER LIFE— Wire and cable measuring wheels made of aluminum and coated with a urethane elastomer (Disogrin) show no wear after six months' operation at a feed rate of 2000 fpm. The supplier of the wheels, Standard Machinery Co., Mystic, Conn., reports they outlast wheels coated with hardened steel spray. Disogrin, produced by Disogrin Industries Inc., Jamaica, N. Y., is cast onto the wheels, then machined to close tolerance.

PURER COLUMBIUM— Using a process called "cage zone melting," Westinghouse researchers say they have produced high purity columbium on a large enough scale to really look into its properties. Unique high temperature properties of the ultrapure metal are of interest to designers.

PUNCHED TAPE WELDER— The machine has cut jet engine assembly and weld time 85 per cent at General Electric's Everett, Mass., plant. It welds small tabs on liners. The tape positions the liner; selects one of three weld currents and one of two time cycles; indicates when to clean the electrodes, when to make sample welds, when to inspect welds, and when to cool electrodes with a water jet. GE expects the device to save $26,000 annually.

RULES FOR FASTENER COATINGS— Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y., has come up with what it calls a suitability scale on coatings for fasteners. It's based on field experience with many applications. Here's the line-up: 1. Hot galvanizing. (It gives longest life under most conditions, but shouldn't be used with prestressed fasteners such as high tensile bolts.) 2. Zinc plate. (It provides good appearance, controlled tolerance of threads, and will take high tension without flaking.) 3. Cadmium plate. (It stands up well in salt atmospheres but shouldn't be used in contact with edibles.) 4. Black oxide coatings. (Their rust preventive characteristics are useful for general applications.) 5. Phosphate coatings. (They offer a limited degree of protection and provide a good base for paint.) 6. Chromium plate over copper. (It should be considered more for appearance than for protection.)

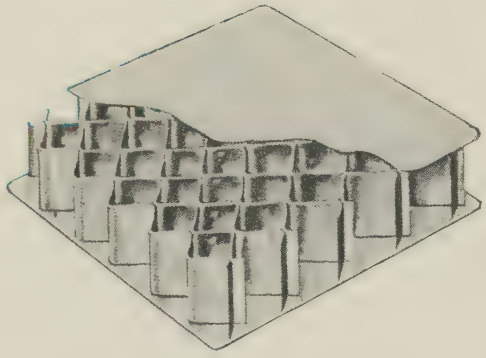
NO HARM— Titanium alloys used in contact with greases and oils have no harmful effects on the life of the lubricant. Watertown Arsenal Laboratories did the experiments.

BETTER CUTTING ANGLE— Air Reduction, New York, says its new adapter for gas cutting torches permits angular adjustments through 250 degrees. It replaces the firm's whole line of angle heads. Applications: Vertical and horizontal cuts, bevels, flanging, and structural shaping.

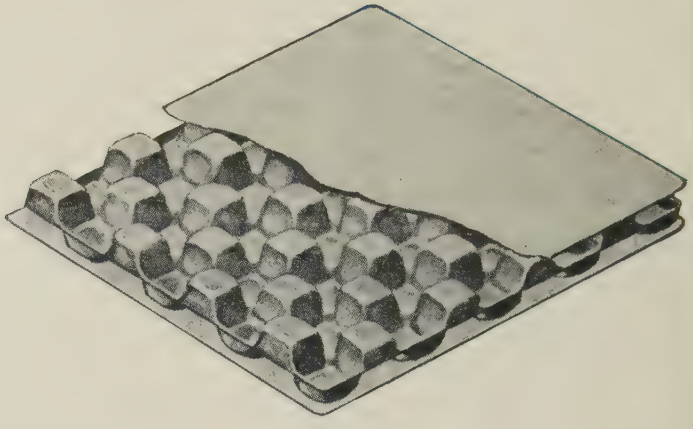
CONTROLS PRECIPITATION— A new static programmer which automatically adjusts electrostatic precipitator voltage for maximum cleaning of smokestack discharges has been announced by General Electric's Industry Control Dept., Roanoke, Va. It can be used with old as well as new installations.

PLASTIC GATE VALVE— Vanton Pump & Equipment Corp., Hillside, N. J., is making an all-plastic gate valve. Called the Flex-Plug, it's recommended for conveying corrosive and abrasive liquids in lines that cannot be chemically contaminated. The valve is rated for 200 lb working pressure and works well in vacuum service.

Three Basic Cores for Sandwich Panels:



HONEYCOMB
Strongest, most widely used.
Hardest to make



WAFFLE
Deep drawn.
Easy to weld

Look What's Happening to Honeycombs

Stainless is tops, say fabricators. Military needs are urgent; civilian applications to follow cost reduction. Here is a progress report on production methods

YOU'LL be seeing a lot of plymetal honeycombs in tomorrow's products.

- Pound for pound, they're lighter and stronger than their solid counterparts.
- They resist extremes of vibration, heat, and sound. The core in some types allows circulation of coolant.

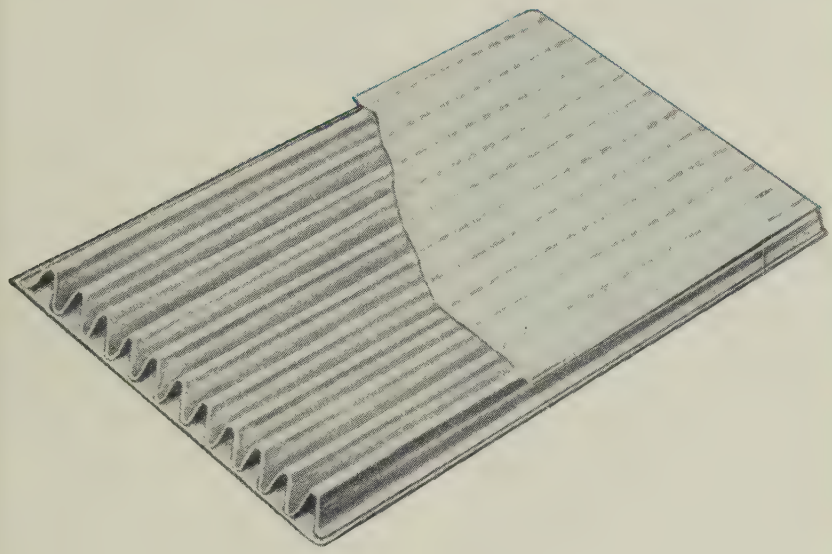
Experts at Thompson Products Inc., Cleveland, suggest that these may be among the first applications: 1. Heat exchangers. 2. Lightweight, high - temperature pressure vessels. 3. Trucktrailers. 4. Inner cabinets of refrigerators (refrigerant will circulate inside the sandwich).

Problems—Like any new product, the honeycomb is having growing pains: Production is slow; costs are high ($300 to $1000 per square foot for stainless). But a recent report on stainless and titanium honeycombs to the assistant secretary of defense points to progress in mechanization. Its authors, W. J. Lewis, G. E. Faulkner, and P. J. Rieppel of Battelle Memorial Institute, Columbus, Ohio, predict increasing production and declining costs by the end of this year.

Here is the substance of the Battelle report, plus some additional information from Solar Aircraft Co., San Diego, Calif.

Key Features—Sandwich structures utilize the full compressive yield strength of thin gage materials. They have been made of wood, aluminum, magnesium, and plastics, and fabricated by gluing or adhesive bonding.

Such structures are good, but unsuitable for elevated temperature applications. The result: A tremendous push to develop the



CORRUGATED
Cheaper than honeycomb.
Easiest to weld

stainless steel or titanium sandwich.

Core Types—There are three: Honeycomb, corrugated, and waffle cores (see above). Variations include small tubes or cones and stringers attached to the facings for stabilization.

All have certain advantages. Honeycomb sandwiches have the same physical properties in all directions and high strength-to-weight ratios. Physicals of corrugated sandwiches are excellent in some directions and not in others. They do not have as wide an application range as honeycomb. Many believe that corrugations and waffles are more feasible than honeycombs for high production and large panels.

Production—You need extremely thin gage foil (0.001 in.) for honeycombs. Stainless 17-7 PH is used almost exclusively. It and Type 321 are available as foils for cores up to 12 in. wide. Experimental materials include Types 310, A-286, and AM 350 stainless; commercially pure titanium; Inconel, Incoloy, and Haynes Stellite 25.

You can get thin sheets (0.005 in. min) of stainless for corrugated or waffle cores and cover sheets. Maximum width is 16 in. for 0.005 in., 30 in. for heavier material. You must buttweld several sheets to obtain greater widths.

Convair panels range up to 3 by 6 ft. They have 17-7 PH stainless honeycomb cores and cover sheets. The brazing alloy is 85Ag-15Mn.

Coremaking—The most common types have square cells and straight cell walls. They are fabricated by resistance welding.

Foil is pierced with 0.025-in. vent holes to permit atmosphere circulation during brazing and prevent pressure rise in service.

Expanded Cores—Flat sheets of foil are stacked, and spot or seam welded to produce an expanded core. Welds are made in rows. Distance between rows determines cell size.

Stacks are built up to about 6 in. After welding, they are slit and expanded accordion fashion. There are generally small variations in the cell size and shape.

The tolerance for expanded cores is plus 0.015 in. It must be machined prior to brazing. Dimensions are varied by splicing.

Preformed Cores—In producing this type, foil is slit to a selected thickness (tolerance is plus or minus 0.003 in.) and formed into half-cell shapes. Former strips are spot or seam welded, producing a core which does not require expansion.

The advantages of the preformed over the expanded core are more uniform cell size and physical properties. Thickness tolerances are held close enough to eliminate machining prior to brazing.

Edging—The dimensions of edge members must be within plus or minus 0.003 in. The most common configurations are Zs and Us.

Sandwichmaking — Brazing procedures require close tolerances and extreme cleanliness. It is common practice to separate cleaning and assembly facilities from the rest of the plant. Some are in dust-free rooms. In addition, the cleaning tanks are used only for sandwich materials. All personnel wear cotton or rubber gloves.

Here are the most important fabricating operations:

1. Core machining.
2. Preliminary fitup.
3. Cleaning.
4. Final assembly.
5. Brazing and heat treating.
6. Inspection.

Machining — The electrolytic process or a hollow-ground disc cutter is widely used. The electrolytic method seems to give cleaner cuts and better tolerances.

Cores must be well supported during machining. They are attached to a steel plate of the required contour by water glass, sugar-water mixtures, or low melting point materials. (Example: Cerrobend.) Occasionally, cores are filled with water and frozen (see photo, Page 119).

Water glass residue (it sometimes appears after storage) can be removed by a 10-minute immersion in this solution:

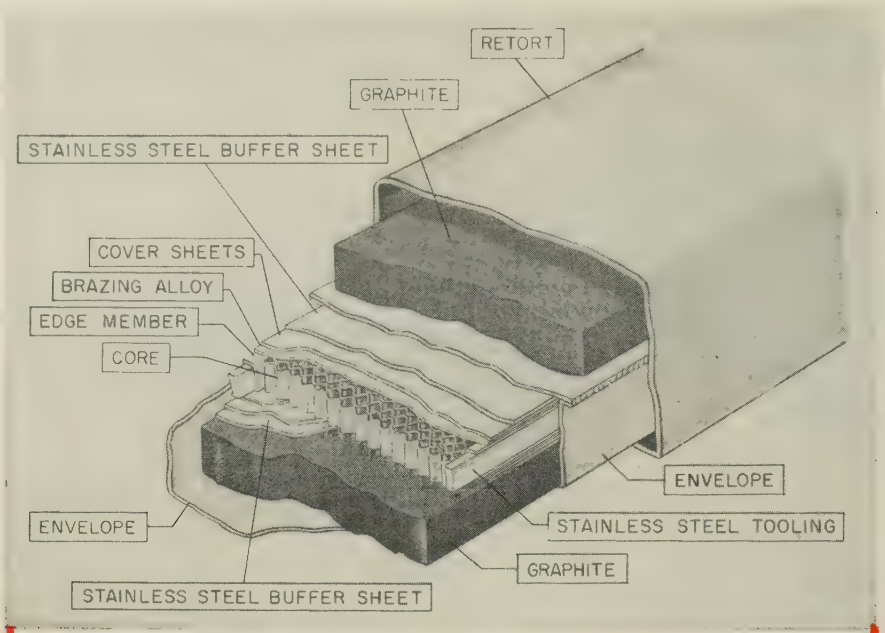
Sulfuric acid—20 per cent by volume.

Nitric acid—10 per cent by volume.

Hydrofluoric acid—2 per cent by volume.

Sodium dichromate—1 per cent

How Honeycomb Is Brazed



This cross section shows the type of tooling used. Envelope fits the sandwich and graphite filler tightly. After a purging with argon, envelope is evacuated through tubes which are attached to the end. Cover is welded to envelope to prevent leakage

by weight. Balance—water.

Cleaning—Good cleaning procedures mean the difference between acceptable and scrapped panels. Crevice corrosion, often observed during service, is minimized by proper brazing and cleaning procedures.

Cores, edge members, and cover sheets are given a preliminary assembly to insure that each panel meets required tolerances. Edge members present the greatest problems. Most are hand cut to the required dimensions.

After matching, parts are carefully cleaned. Here is a typical process:

1. Remove mill numbers and markings.
2. Degrease.
3. Pickle. (Nitric acid, 6 to 7 per cent by volume; hydrofluoric acid, 6 to 10 per cent by volume; balance, water. The solution is buffered with stainless steel and used at 130 to 150° F. Maximum pickling time: 1 minute for edge members and cover sheets; 30 seconds for cores.)
4. Rinse and dry.

If there is a delay of more than 72 hours between pickling and brazing operations, parts must be recleaned.

Filler Metal, Too—Some people degrease and pickle the brazing alloy; others only degrease it. In the former method, degreasing is followed by 10 per cent nitric; rinse; chromic acid solution; repickle in nitric; rinse and dry. Again, use the metal within 72 hours.

Brazing — For ideal brazing, chemical cleanliness is vital, says Solar Aircraft. Braze flow must be complete. Several methods are suggested:

1. High purity, dry hydrogen gas to reduce metal oxides.
2. Fluxes which react with or dissolve surface oxides.
3. Self-fluxing brazing alloys which "clean as you go."
4. Vacuum atmospheres which decompose or evaporate oxides and contaminants.

Alloys — Certain filler metals contain elements which increase wetting and flow. Brazing with a silver containing lithium involves two stages. Lithium in a silver brazing metal aids two ways: 1. Filler metal melts and flows more easily into joints or surfaces coated with thin oxide films. 2. Diffusion between surface film and filler metal continues during the brazing cycle, establishing true metal-to-metal joints by dissolving or decomposing surface films.

Assembly — Final assembly is critical and time consuming. Core, cover sheets, and brazing alloy are placed in a jig and tackwelded so that the panel is self-supporting. Each outer core cell is carefully tackwelded to the edge members which are in turn tackwelded to the cover sheets. A wetting agent (sodium tetraborate) is also ap- (see sketch at left).

Assembled panels are placed in brazing fixtures called envelopes (left).

Panels are supported on graphite or metal tools machined to the shape of the panel. When graphite tools are used, thin stainless steel panels are separated from them. Separators are used to prevent carbon pickup.

Most fabricators use graphite tooling. Egg-crate tooling made from stainless steel is favored by some.

Moisture is a problem in graphite. It causes poor brazes. Graphite must be dried and stored in dryers to minimize moisture pickup.

Heating — After thermocouples are attached to the panel, the envelopes are welded shut. They are placed in retorts and partially evacuated forcing the covers against the panels. Pressure differential is about 4 psi.

Before evacuation, envelopes are purged with argon which provides an inert atmosphere for brazing.

Retorts are heated to 1815° F, held 15 minutes, cooled to 1400° F, and held for 1½ hours. After removal from the furnace, they are cooled to room temperature.

After cooling, panels are removed and cooled to minus 20° F. They are radiographed to check the bond between members.

Panels are finally aged at 1050° F to develop maximum strength.

Metallurgical Consultants Inc., Maywood, Calif., heat treats precipitation hardening stainless pan-

els during brazing. It eliminates a separate heat treatment.

Retorts are placed in a hydrogen atmosphere furnace and heated to 1925° F. Subsequent steps include lowering to transformation temperature, a holding period, and cooling to 50° F.

Inspection—Convair checks dimensions and mechanical properties in its panels:

Cell size is measured over five cells. Width of node and welds in nodes must be at a minimum and should not exceed 1/16 in. Node welds must withstand 5 lb per spot; seam welds must hold 40 lb per ½ in.

Cores are evaluated in a tensile machine for flatwise compression and for core tension.

Radiographic inspection (not 100 per cent reliable) is sometimes supplemented by a "flash heat." Quartz heaters raise a small area of panel facing to 650 to 850° F in 2 seconds. The heat sets up a compression stress of about 30,000 psi. If the skin doesn't buckle, the panel passes the test. But radiographic tests must still be used on edge members.

Production methods are qualified by destructive tests of small brazed samples. Each full-sized panel has a small tab which is checked for tensile strength to insure that the stainless is properly heat treated. The small panels get these tests: 1. Edge compression. 2. Core shear. 3. Simple beam. 4. Tensile.

Development—Engineers at Solar say: "Urgent military requirements predominate. Don't underestimate the need for government sponsored production development." They indicate that solutions to these problems are of prime importance:

1. High precision sheet metal components.
2. Special purpose brazing equipment.
3. More reliable, nondestructive tests.
4. Better repair techniques.
5. Skilled technicians.
6. Experienced specialists in process control.

Under government sponsorship, resistance welding machines are being developed. One will produce panels 4 by 14 ft. It attaches cover sheets to square honeycomb cores with corrugated cell walls.

Northrop Aircraft Inc.

Water, poured into a stainless honeycomb blank, gets a quickfreeze from the refrigeration unit in the foreground. Foil structure can then be milled as readily as steel

Another machine being developed uses cores with sine shaped cells.

Several firms are working with corrugated cores. With removable mandrels, it's possible to weld with conventional procedures.

Some work is being done with waffle cores. Two approaches are used: 1. Heliarc spotwelding without backup. 2. Conventional spotwelding with expendable electrodes. Placed inside the core, they serve a dual purpose, as supports and as electrical conductors.

Adhesives—Producers of stainless sandwich structures would like to use adhesives. Reasons: Production experience gained from aluminum sandwich construction; tolerances are not so critical; fabrication temperatures are low; and cost is lower.

Most of the experimental work has been done with an epoxy phenolic resin. Its main drawback is deterioration at high temperatures. Shear strength at room temperature is 3000 psi. At 500° F, it drops to 2000 psi which is maintained for 8 hours. At 200 hours, the bond is broken.

The goal is an adhesive with a joint shear strength of 1000 psi after aging at 500° F for 200 hours.

One firm, Rubber & Asbestos Corp., Bloomfield, N. J., believes it has the answer: An adhesive epoxy tape called Plymaster 1020. Lap shear strengths of 1750 psi at room temperature drop to only 1400 psi after exposure to 455° F for 200 hours.

Another tape is combined with a liquid primer. Beam flexural strength at 500° F is 1400 psi after a 10-minute soak.

Titanium—Sandwich structures of this metal are lighter than those made from steel. Progress has been limited.

Two factors are holding back its use: 1. Lack of titanium foil. 2. No satisfactory process for fabricating panels has been developed.

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, Ohio.*

Guides for a Successful Foundry Hydraulic System

1. Standardize on the smallest possible number of different hydraulic components (valves, pumps, etc.).
2. Arrange all possible valves, limit switches, pumps, and cylinders for rapid exchange.
3. Protect pipelines from vibration, particularly from vane pumps, by using hoses or accumulators, or both.
4. Provide standby units.
5. Operate at the lowest pressure that your machine design will permit.
6. Protect control equipment from foundry atmospheres.
7. Reduce screw-type joints in piping systems to the barest minimum.
8. Avoid use of water base hydraulic fluid as a bearing lubricant.
9. Allow sufficient reservoir capacity as an aid to temperature and contaminant control in the hydraulic system.

How To Keep a Foundry Automatic

Freedom from maintenance problems has been built into a new foundry. Key factors: Vibration control, standard components, rapid equipment changeover

IN CHATTANOOGA, Tenn., Combustion Engineering Inc. will soon unveil an automatic foundry for cast iron soil pipe. Before it was finished, it was turning out 300 miles of soil pipe a month on a time cycle of 35 minutes from molten metal to finished product —painted and ready to ship.

The plant is unusual from many points of view:

1. It is a second-floor operation, which eliminates the pits and tunnels commonly associated with mechanized foundries.

2. Although it uses some 500 patterns to produce soil pipe fittings, the patterns are made up of come-apart modules assembled on a single size of mold board.

3. Most of the production units were designed, developed, and constructed by Combustion Engineering personnel.

4. Modular, quick-change units are used wherever possible to keep downtime to a minimum (the plant operates around the clock).

5. Controls are sealed against dust and, where possible, are isolated in pressurized rooms.

6. The production machinery is almost entirely hydraulic.

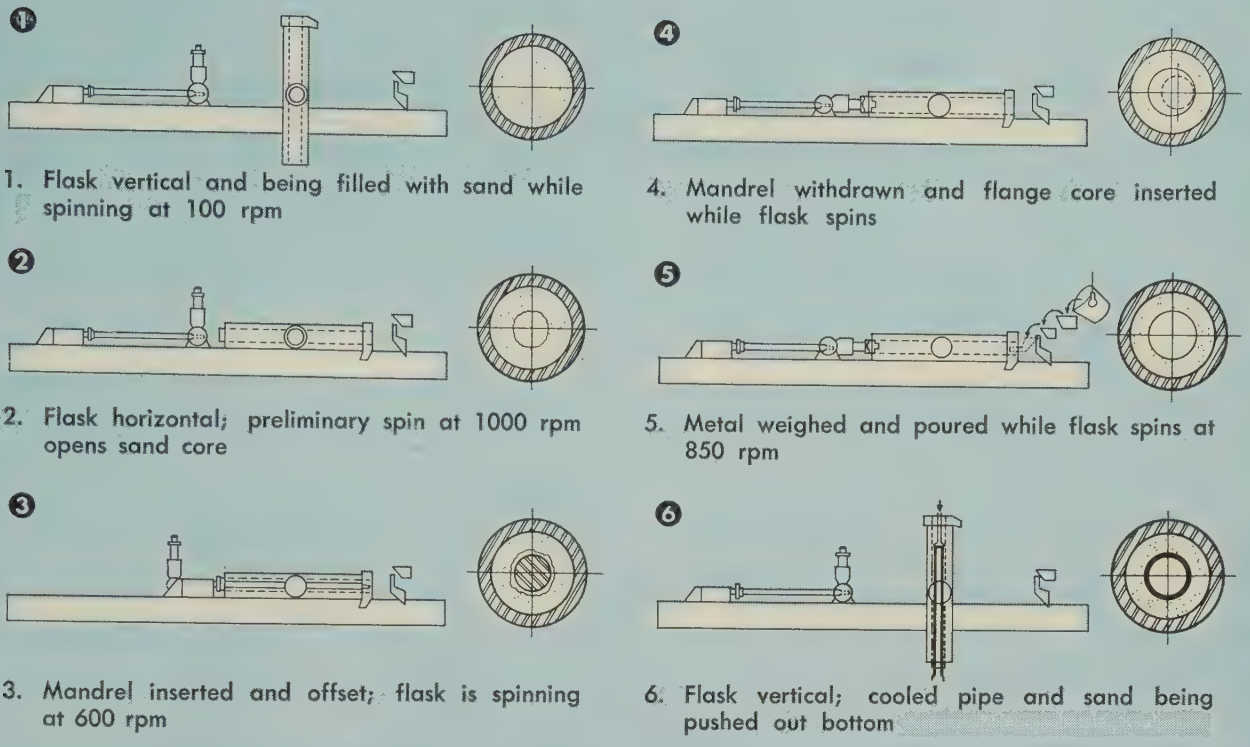
Casting Machines — Details of the foundry were revealed for the first time at the recent Fabricating Machinery Hydraulic Conference sponsored by Vickers Inc. in Detroit. John S. Lasater, foundry plant engineer at Combustion Engineering, described hydraulic applications in the plant, particularly on the centrifugal pipe-casting machines.

These machines cast two pipes at once in sand-lined molds. The molds are rotated by a single 30 hp, direct current motor, which in turn is powered by a 40 hp, motor-generator set with electronic speed controls. The cycle time is normally 90 seconds with the molds being formed and the metal poured in 45 seconds. The balance of the time is used for cooling while the mold is idly spinning. For one cycle, 43 actions must take place, most of them hydraulic.

Reliability — The machines are automatic even to weighing the metal, so reliability of controls is of prime importance. Control rooms adjacent to the casting machines house the pumps, hydraulic and electric control panels, and the motor-generator set. These dust-free rooms are held under a slight pressure by blowers acting through air filters.

Each pipe-casting machine is equipped with two V-460 vane type pumps mounted on both ends of

How the Centrifugal Pipe-Casting Machine Works



1. Flask vertical and being filled with sand while spinning at 100 rpm

2. Flask horizontal; preliminary spin at 1000 rpm opens sand core

3. Mandrel inserted and offset; flask is spinning at 600 rpm

4. Mandrel withdrawn and flange core inserted while flask spins

5. Metal weighed and poured while flask spins at 850 rpm

6. Flask vertical; cooled pipe and sand being pushed out bottom

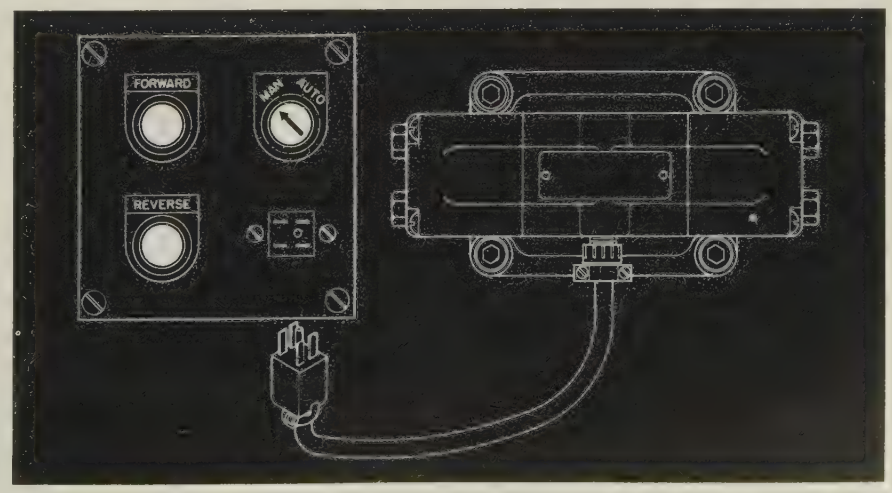
a jackshaft through chain couplings. The jackshaft is driven by a 30-hp motor through V-belts. Only one pump is in operation at a time, the second being a standby. In case of pump trouble, by opening one valve and closing another and switching the chain from one coupling to the other, the operator can activate the alternate pump in a matter of a few minutes. Afterward, the pump or its cartridge can be replaced at leisure.

Temperature — The pumps are mounted atop a 300-gallon tank with the top arranged to drain the fluid spilled while changing pumps or cartridges back into the tank. "We found that we have better control of fluid temperature and solids settlement when we doubled the 3 to 1 rule of thumb tank to pump proportion," said Mr. Lasater. "Each tank is provided with internal cooling coils that maintain the fluid temperature at about 120° F."

There are two points in the machine cycle, each of several seconds duration, where the fluid requirement exceeds the pump delivery. This is accounted for by accumulators. The pump manifold is connected to the accumulator manifold with a high pressure hose to damp out high frequency pump vibrations that had been the cause of troublesome leaks.

Valves—All control valves are gasket mounted and standardized on two sizes—¾-in. and 1¼-in. closed center types. "To insure machine accuracy," said Mr. Lasater, "we hold pressure on one side of every cylinder at all times, and to prevent the accidental shifting of valve spools by surges or other vibratory influences, we energize one of the valve solenoids at all times.

"Our valves are all outfitted with standard length leads terminating in a plug (see below). Benefit from gasket mounted valves seems to be small if the electrical connections are unwieldy. Plug connections are



Typical quick-change valve mounting arrangement

standard throughout the plant. This enables us to have prewired valves in stock that will fit on any machine using that size valve."

Switches — Control circuits are all alternating current. Hermetically sealed, aircraft type limit switches have been found most satisfactory. These switches, like the valves, have standard leads terminating in plugs. The plugs, because of vibration, are screwed together rather than being held by friction as are the valve plugs.

Tubing used to pipe the machines has been standardized on two sizes: ⅞-in. x 0.062-in. wall used with flare type fittings and 1¼-in. x 0.140-in. wall used with weld type fittings.

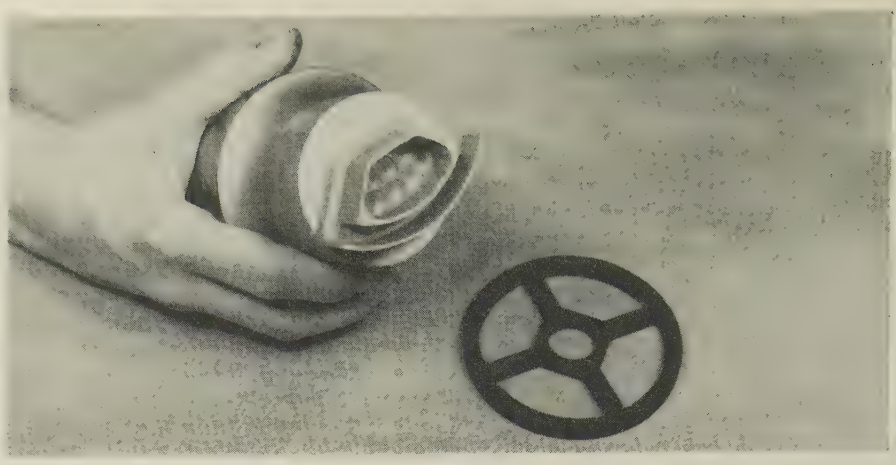
Cylinders — Following out the scheme of interchangeability and quick replacement, all cylinders are arranged for gasket mounting.

Because of the relatively easier protection problem for rotary motions as against straight line motions, the casting machine was designed to have most of its motions rotary. To facilitate this, the company developed its own line of hydraulic rotating cylinders.

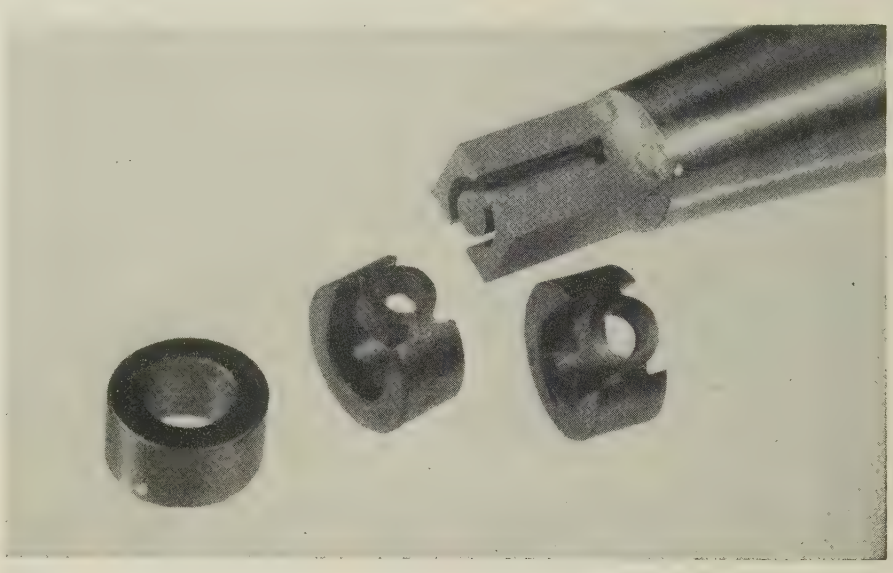
These cylinders (nothing is exposed) have been remarkably trouble-free. They have leather cup packings rather than the O-ring packings usually found in commercial types. This type cylinder has a constant angular velocity, whereas a straight line cylinder with a bell crank has a variable velocity.

Fluids—The line pressure for all the equipment is 500 psi. Cylinder areas are proportioned to accomplish the job at this pressure. However, each component is designed to withstand 1000 psi.

The new plant uses fireproof hydraulic fluid, but is not overly happy with it. According to Mr. Lasater: "It certainly is not true that packings are not adversely affected by it, and perhaps the best thing that can be said about it at this time would be that we have not had a fire." He thinks that the fireproof emulsions are an interim arrangement to permit the use of water base fluids in equipment designed for oil, and that eventually a shift will be made to hydraulic systems designed for water operation.



Ultrasonic tool trepans a quadrant from this ferramic ring



A complex shape is cut in this tough-to-machine saturable reactor core. The tool is shown at upper right; cores are shown before and after cutting

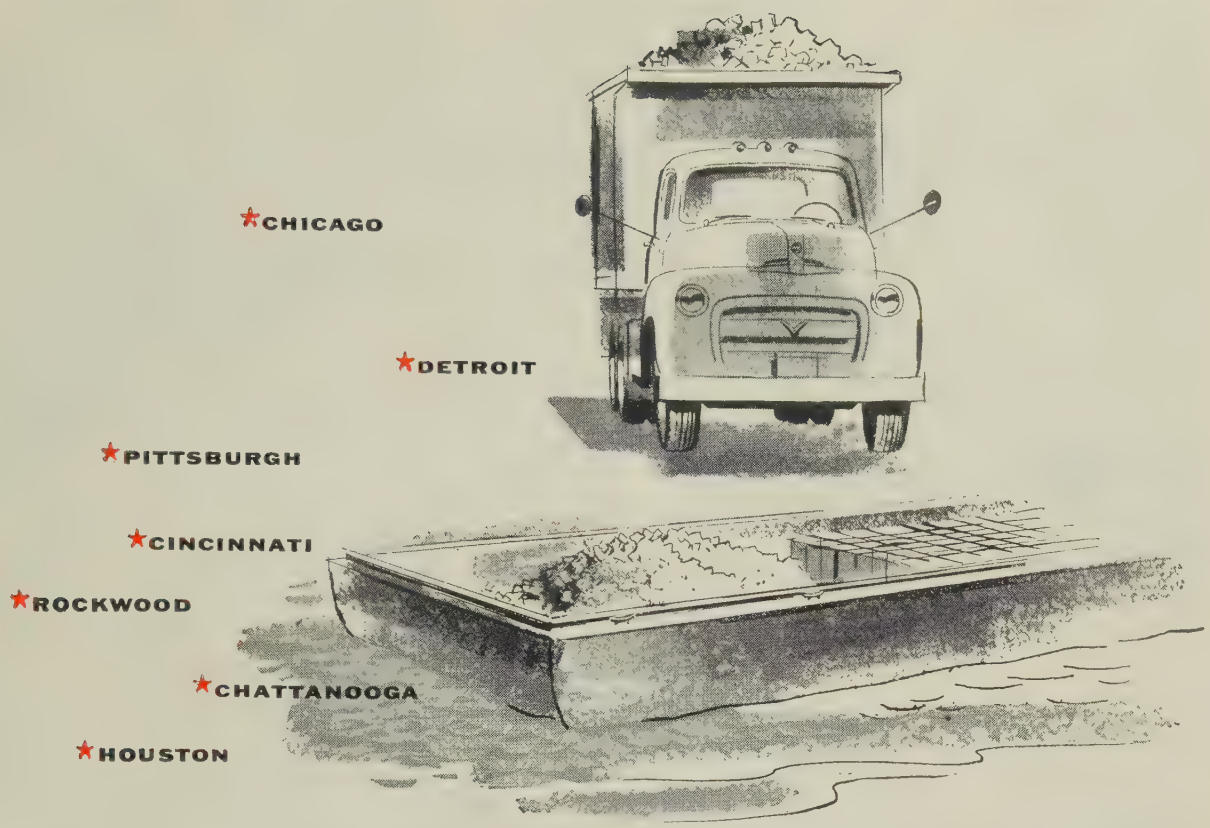
Ultrasonic Machining Gains

ULTRASONIC machining is finding a niche in shaping ferrite and other hard, brittle materials.

A report from Sheffield Corp., Dayton, Ohio, tells of several close-tolerance jobs where ultrasonics have solved production problems. On one, a 0.0015-in. wide slot is cut through the wall of a ferrite toroid. The slot is used to hold a 0.001-in. thick silver pickup. The parts are used by the hundreds in electronic calculators. Experts are working now on expanding production so large numbers of the slots can be machined at once.

On a job machining ferramic rings (see top photo), a trepanning type tool is designed so slugs of the material are removed. This makes it unnecessary to machine the whole area and holds stock removal to a minimum.

On another ferrite part (see bottom photo), ultrasonics have replaced a diamond-wheel operation. The wheels used to load, causing breakage.



You get

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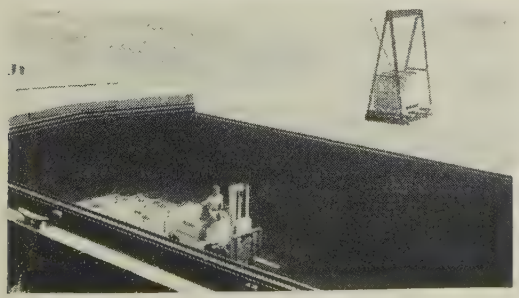
Operations at the Pittsburgh terminal.



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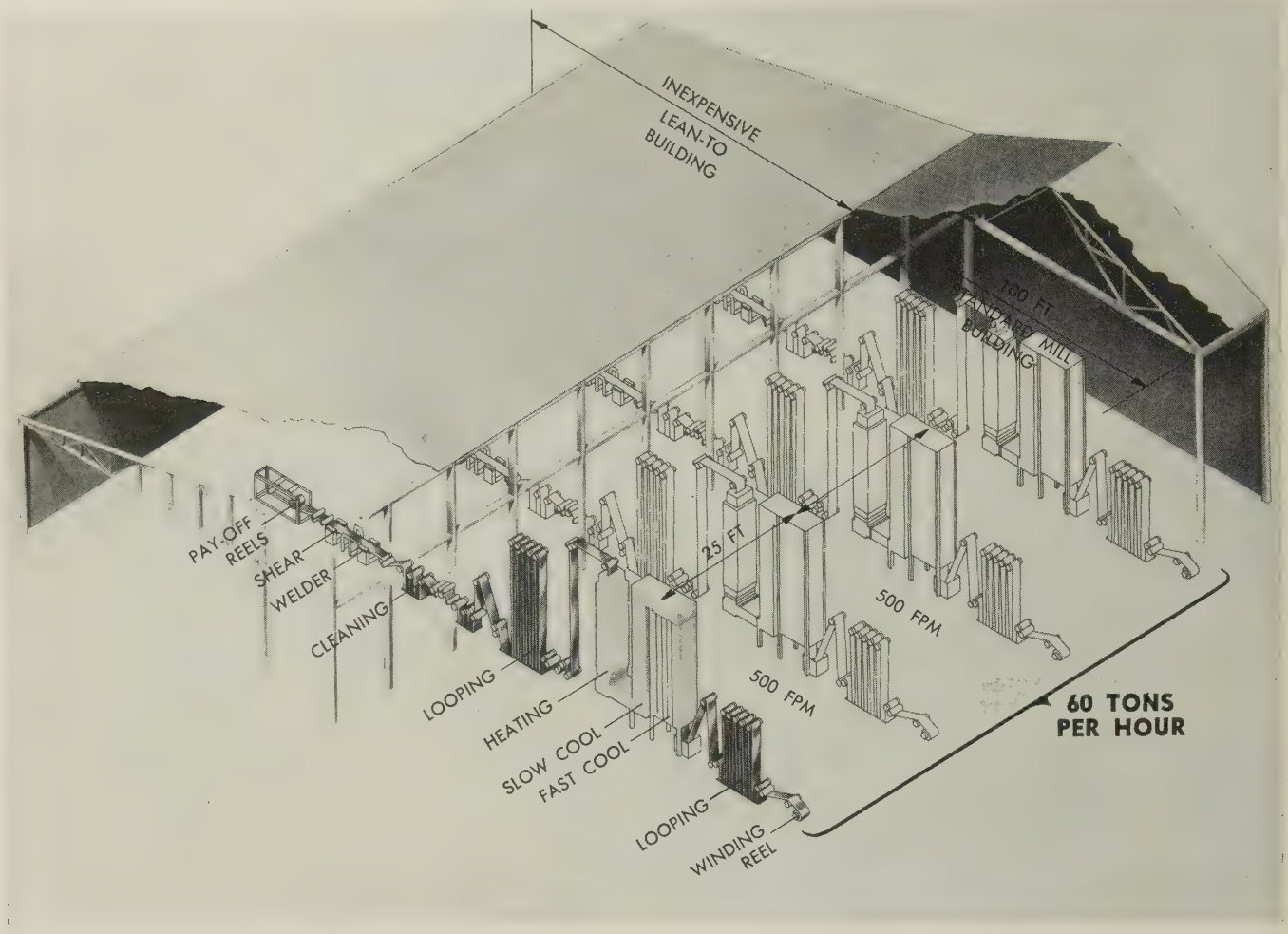


Lines Anneal Fast without Soaking

Battery of four at Bethlehem Steel's Sparrows Point plant, operating at 500 fpm, handles 60 tons of tin plate per hour. Short length makes across-the-building workflow possible

WITHIN the past year, Bethlehem Steel Co. has installed four continuous annealing lines which increase the tin plate annealing capacity of its Sparrows Point, Md., plant by 400,000 tons a year. Delegates to the 50th anniversary convention of the Association of Iron & Steel Engineers (Pittsburgh) heard the lines described by Quentin Bloom, manager of the Furnace & Kiln Div., Selas Corp. of America, Dresher, Pa.

The importance of this 60-ton per hour installation is shown by the recent growth in tin mill products, said Mr. Bloom. Production of electrolytically coated tin plate increased from 1.6 million tons in 1947 to an estimated 4.8 million tons in 1957 (over 300 per cent). During the same period, continuous annealing progressed from a dream to 20 per cent of tin mill production.

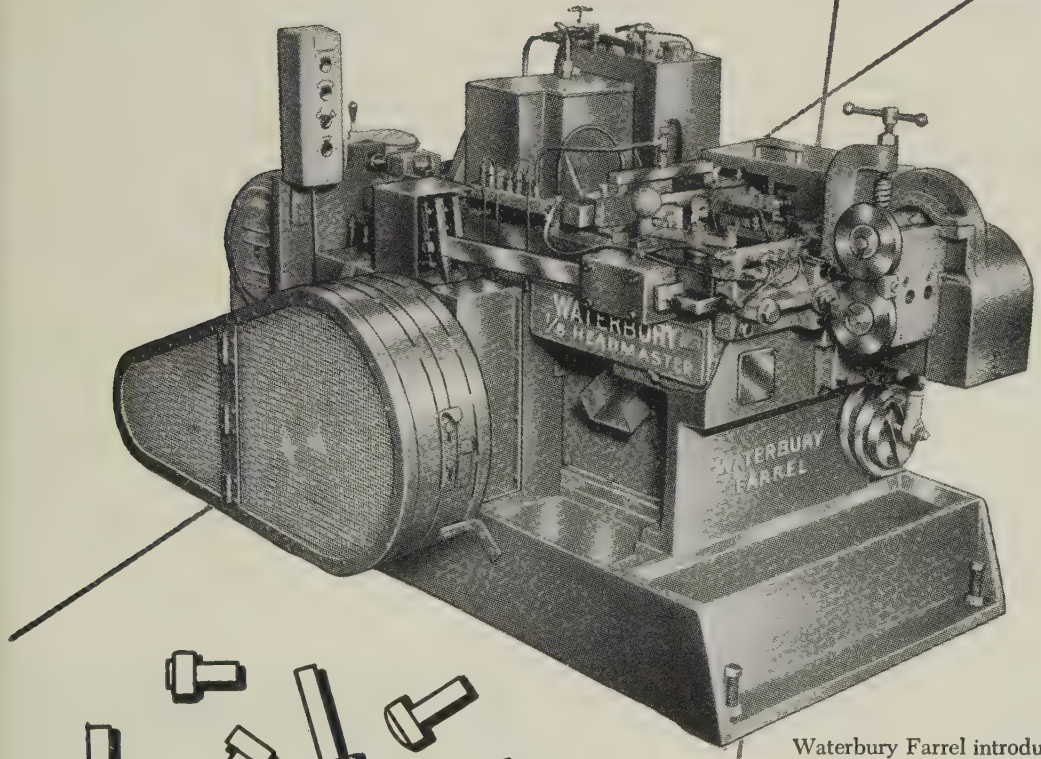
Tin plate production is still on the increase and should reach 5.6 million tons per year in 1959. By that time, 2 million tons (36 per cent) will be continuously annealed, he estimated.

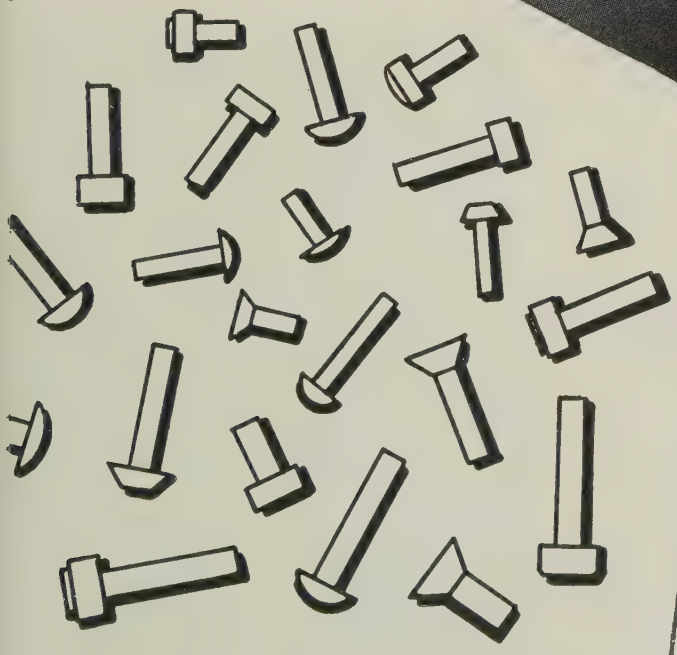
Joint Research—With this market trend in view, Bethlehem decided in 1955 to install four 500-fpm lines as the most efficient way to achieve a 60 tons per hour annealing rate. The decision was based on co-operative research undertaken shortly after World War II by Bethlehem and Selas. The

New! World's Fastest!

WATERBURY FARREL "HEADMASTER"

Heads 300 To 450 Screw Or Rivet Blanks Per Min.





Waterbury Farrel introduces a revolutionary new concept in cold heading speeds... proven by actual production runs to be the world's fastest rates achieved by a solid die double stroke header.

Operating at speeds from 300 to 450 blanks per minute, the machine will head rivets up to ⅛" x ¾, machine screws up to #6 x ¾, and sheet metal screws up to #8 x ¾.

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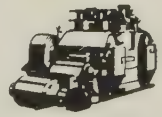


Sendzimir Mills and Other Special Machinery

WATERBURY FARREL FOUNDED 1851

WF-33

Highlights from the Oxygen Session at

Benefits of Purchased Oxygen

"The manufacture of oxygen can, under some circumstances, be profitable for a steel manufacturer and in others it can be more practical to purchase oxygen from an on-site or off-site supplier's plant. Some of the more important factors which would influence the decision would be: Availability of excess byproduct fuels, steam and/or power generating capacity, cost of purchased power, quantity of oxygen required, availability of land and water resources, degree of protection required for continuity of operations, and availability of capital. There is no rule which will fit all oxygen consumers or any consumer at all times. Each must make his own choice based on his particular set of circumstances.

"By purchasing oxygen, Inland has been able to secure large quantities for experimental use and later for regular production use without capital expenditure for oxygen production facilities."

"Benefits of Purchased Oxygen to the Indiana Harbor Works of the Inland Steel Company,"
N. R. Kirkdoffer, superintendent, Power, Steam and Combustion Depts., Inland Steel Co., East Chicago, Ind.

Summary of Operating Results

Oxygen iron and steelmaking practices are one of the outstanding contributions to increased production during the past decade. The following is a rough estimate of the quantities of oxygen now being used in the various operations:

Open hearth lancing	150 to 300 cu ft per ton of ingots
Open hearth roof jets	100 to 500 cu ft per ton of ingots
Open hearth combustion	125 to 500 cu ft per ton of ingots
Bessemer converter	400 to 500 cu ft per ton of steel
Top blown converter	1800 to 2200 cu ft per ton of ingots
Hot scarfers	100 to 150 cu ft per ton of slabs
Blast furnaces	1200 to 4500 cu ft per ton of pig iron at 1 to 4 per cent enrichment

"Summary of Operating Results with Oxygen,"
J. H. Strassburger, assistant vice president, National Steel Corp., Pittsburgh.

objectives were to bright anneal low-carbon steel strip continuously and to produce strip which would respond properly to standard steel mill pickling and tinning practice, meet tin plate corrosion test standards, and have satisfactory forming characteristics for can manufacturing.

A continuous annealing pilot line was set up in the Selas laboratory. It operated at speeds up to 150 fpm and handled strip 5½ in. wide in coils weighing up to 1500 lb. The tests showed: 1. Steel could be rapidly heated in a direct-fired furnace and remain bright and clean. 2. The annealing temperature was not critical. 3. Cooling rates should be kept within certain limits to obtain desired annealing characteristics. 4. The needed properties can be obtained without a soak.

Ideal Rate—The studies indicated that 500 fpm was the most economical strip speed, but the design provides for speeds of over 700 fpm (22 tons per hour) with relatively minor alteration.

Significant economies result from operation at 500 fpm. 1. At that speed, the line operates with few interruptions and produces a high prime yield. 2. It eliminates the need for careful selection of cold reduced coils. 3. It avoids problems that arise as speeds increase, such as lubrication of hot rolls, tension control, storage of strip in the looping towers, and tracking.

The four lines have a rated capacity of 15 tons per hour each but have annealed 19 tons an hour on limited runs. They handle strip to 44 in. wide, in thicknesses of 0.0066 to 0.015 in. Each line operates at a preset constant speed without slowdown for welds or coil splicing.

Condensed—The short time-temperature annealing cycle lent itself to a unit installed across a building as shown on Page 124. The annealing furnaces, including cooling sections and looping towers, are installed across a normal mill building which is 100 ft wide. The handling equipment at each end of the line is installed in inexpensive lean-to type buildings.

The work flows into the building at one side, through each of the four annealing lines, and exits from the building at the other side. Another line can be installed easily without altering material flow by adding one 25-ft bay.

Components—The heating and cooling sections were designed and built by Selas. Handling and cleaning equipment was designed and built by Mesta Machine Co., Pittsburgh.

The line includes: Two payoff reels (to handle coils with a maximum outside diameter of 73 in.), a two-pass pinch roll, two-pass crop squaring shear, a double seam welder, and a pinch roll at the entry end.

The strip runs through an electrolytic cleaning section, a bridle roll, and a feed looping tower. Another pinch roll and a tension regulating unit precede the annealing furnace and cooling unit.

Immediately following the annealing unit is a second pinch roll, the exit looping tower, a third pinch roll, and a single tension winding reel.

Heating—The annealing unit is a single pass, gas-fired furnace with retarded cooling and fast cooling sections. The strip enters at the top of the furnace and passes downward through three separately controlled heating zones, each of which consists of a pair of panels, one on each side of the strip.

Each panel is studded with Duradiant burners, so arranged that the strip temperature is uniform as it leaves the furnace, without soaking. The Duradiant burner is a ceramic cup that becomes incandescent as the flame wipes its

The AISE 50th Anniversary Meeting

On Site Oxygen Operating Expense

Ingot Operating Level—per cent	100	80	70	50
Oxygen Consumption—1000 cu ft	67,530	52,390	43,375	30,690
Operating Cost Incl. Lease Charges	$58,700	$54,000	$50,800	$44,900
Unit Cost per 1000 cu ft	$ 0.869	$ 1.031	$ 1.171	$ 1.463
Operating Cost details—per cent				
a) Operating Labor	6.7	7.2	7.7	8.7
b) Maintenance, Labor, Materials & Supplies	10.2	9.8	7.5	6.0
c) Technical Services	0.7	0.6	0.6	0.7
d) Utilities	38.2	34.2	33.1	26.8
e) Lease Costs	44.2	48.2	51.1	57.8
	100.0	100.0	100.0	100.0

"Economics of Generated Versus Purchased Oxygen for Steel Plant Use," R. A. Lambert, superintendent, Steam Efficiency and Combustion Dept., Pittsburgh Works Div., Jones & Laughlin Steel Corp., Pittsburgh.

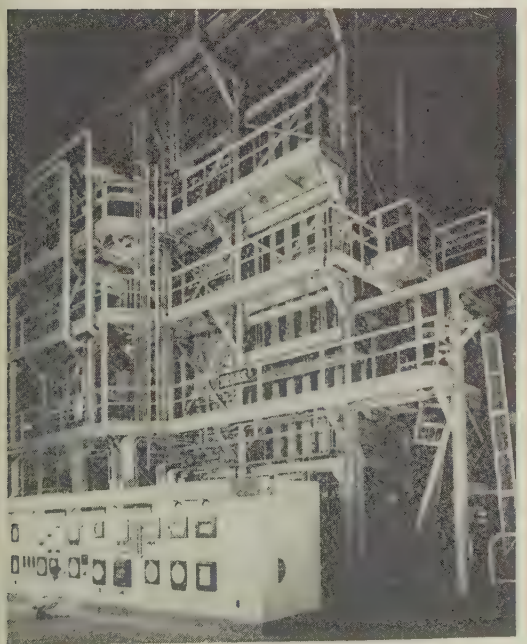
surface, catalyzing the combustion and converting much of the heat into radiant energy.

The 28-ft vertical furnace is designed with a side door so that it may be rapidly withdrawn from the strip in case of stoppage and for convenience when threading. Rapid furnace withdrawal prevents melting or weakening the strip in case of a stoppage.

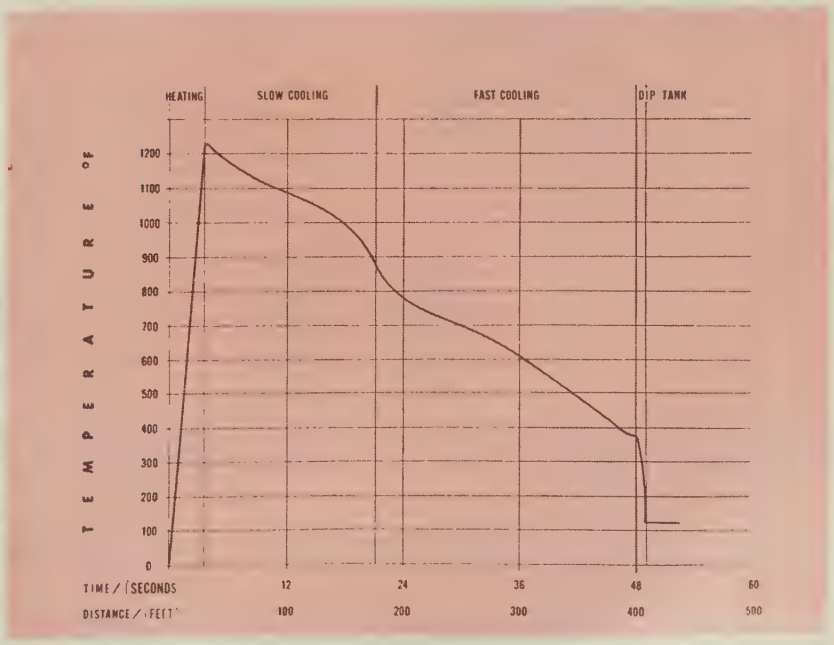
The strip is exposed in the heating furnace about 3.6 seconds. This single pass without roll contact represents about 30 ft of effective heating length.

Slow Cooling — After passing through the heating section, the strip goes through a pair of seal rolls and enters the cooling section. Here it is protected from oxidation by a 4 per cent hydrogen, 96 per cent nitrogen, atmosphere.

The retarded cooling section begins with a bottom crossover duct and a three-pass vertical refractory-lined chamber. The crossover



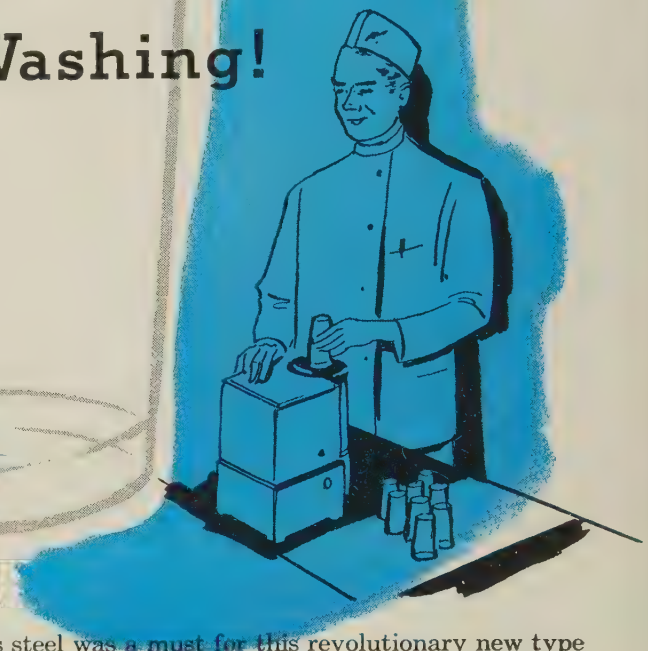
Central control cubicle. Instruments are keyed to the graphic flow diagram

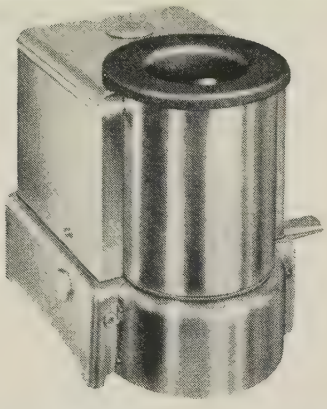


Time-temperature curve for one of the fast heating tin plate annealing lines at Bethlehem's Sparrows Point plant

STAINLESS Helps Revolutionize Glass Washing!

How the Right Grades of Stainless Steel from THE HOUSE OF STAINLESS Help Manufacturer Win Acceptance for New Cold-Water Commercial Glass Washer





Photo, courtesy
The Cunningham Company,
Chicago

Stainless steel was a must for this revolutionary new type of restaurant equipment. For sanitation. For corrosion resistance. For maintenance-free service, and for attractive appearance to harmonize with existing equipment.

However, to take full advantage of the qualities inherent in the different grades of stainless steel, Cunningham engineers called on the free metallurgical service available at The House of Stainless. Through these consultations, not only were the proper grades selected, but fabrication methods were determined to facilitate production and assure the high quality to meet the manufacturer's standards.

In developing a new product or in re-designing your current line, you are welcome to utilize the metallurgical service available at CSS without cost . . . if only to substantiate your own thinking. It's a sound way to give your products the benefits of the knowledge gained over the years in the laboratory and in the field.

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PROGRESS . . .

duct is equipped with electric heating elements which are controlled by a proportioning Reactrol system used in conjunction with strip temperature measurement. The vertical section is also equipped with electric heating elements and complemented with air-cooling tubes. It can add or remove heat.

The heating elements do not function when the line is operating. They maintain the temperature during strip stoppage and prepare the unit for operation after a halt.

Fast Cooling — The five-pass rapid cooling section immediately follows the retarded cooling section and is made up of five completely enclosed water wall ducts. Each is divided into three units so arranged that the water flowing into the wall of the duct is individually regulated and can be manually controlled.

On leaving the water-jacketed section, the strip enters a dip tank where it is cooled down to about 125° F, then passes out through a pair of squeeze rolls and a strip dryer before entering the exit looping tower.

Start-Up—Threading is greatly simplified. Four of the upper rolls in the cooling section are driven. The rolls have overriding clutches, since no driven rolls are required in the heating and cooling sections during normal operation. Tension control is automatic (there are no free loops).

The entire process is controlled from a central control cubicle arranged as a graphic panel. Instruments automatically record and regulate the rate of fuel flow; temperature of the crossover duct; temperature of the slow cool unit; water temperature of the dip tank; strip speed; furnace pressure; fuel input; atmosphere gas pressure, dew point, and hydrogen content; and cooling water temperature.

Fast — The annealing cycle is much faster than usual. It requires only 49 seconds (some installations which require holding time need as much as 2 minutes). The aim of short cycle treating is to recrystallize the cold work ferrite grain structure. It is done by heating to a temperature above the recrystallization temperature (about 1050° F in this case) but below the lower critical transformation temperature (1330° F).

The extremely short time and relatively low temperature are effective because the strip reaches high temperature before nucleation begins. Recrystallization is completed before any growth of unstrained grains can start.

For the balance of the cycle, it is only necessary to retard cooling between 1100° F and 900° F to let the carbon dissolved during heating precipitate and avoid aging effects. Cooling below 900° F is carried out in water-jacketed ducts, after which the strip is water dipped.

Results—Excellent product uniformity has been produced on these lines. The fine grained annealed steel (universal temper "TU") is stiffer and stronger than batch annealed tin plate but is characterized by improved uniformity and drawability. The average hardness for the center and edge varies but half a point for the TU material in the as-annealed condition; in T6 material the average hardness is the same for both center and edge.

The trend today is to lighter gages. This line has operated over 70 per cent of the time on 0.0094 in. or lighter. It has also operated on gages up to 0.015 in. Its maximum production to date has been 19.9 tons per hour of 0.0125-in. strip, 33¼ in. wide.

More AISI Meeting Highlights

Wire Stress Relieved by High Velocity Gas Heating

Faced with the problem of developing equipment to stress relieve ⅜-in. wire strands at the rate of 2 tons per hour, John A. Roebling's Sons Corp. came up with a high velocity gas furnace. The unit is of the recirculating type with hot fan and direct fired gas heater. It does not use a lead bath. Heatup is fast, uniform, and easily controlled; operating costs and maintenance are low.

—EDWARD M. YARD, chief product engineer, mechanical, John A. Roebling's Sons Corp., Trenton, N. J.

Co-operation Brings Increased Open Hearth Production

What can be done to increase open hearth production when management gives 100 per cent backing to a program can be seen at the Steel Co. of Canada. Production has gone up 80 per cent. Increased firing rates are the biggest factor. ("Nobody ever obtained four furnaces cheaper.") The company is experimenting with high velocity air blown across the roof to protect the refractories.

—E. T. W. BAILEY, chief combustion engineer, Steel Co. of Canada Ltd., Hamilton, Ont.

Ingot Buggies Grow Lighter, Faster

The trend for the ingot buggy to become mechanically massive and electrically simple is reversing as cable-driven types become more popular. Removing self-propelling machinery and the restricting collector rails makes it possible to develop improved control schemes featuring automatic spotting and regulated acceleration. The buggies tend to become lighter physically, faster, and more reliable.

—H. G. FROSTICK, general supervisor, design engineering (new mill construction), South Works, United States Steel Corp., Chicago

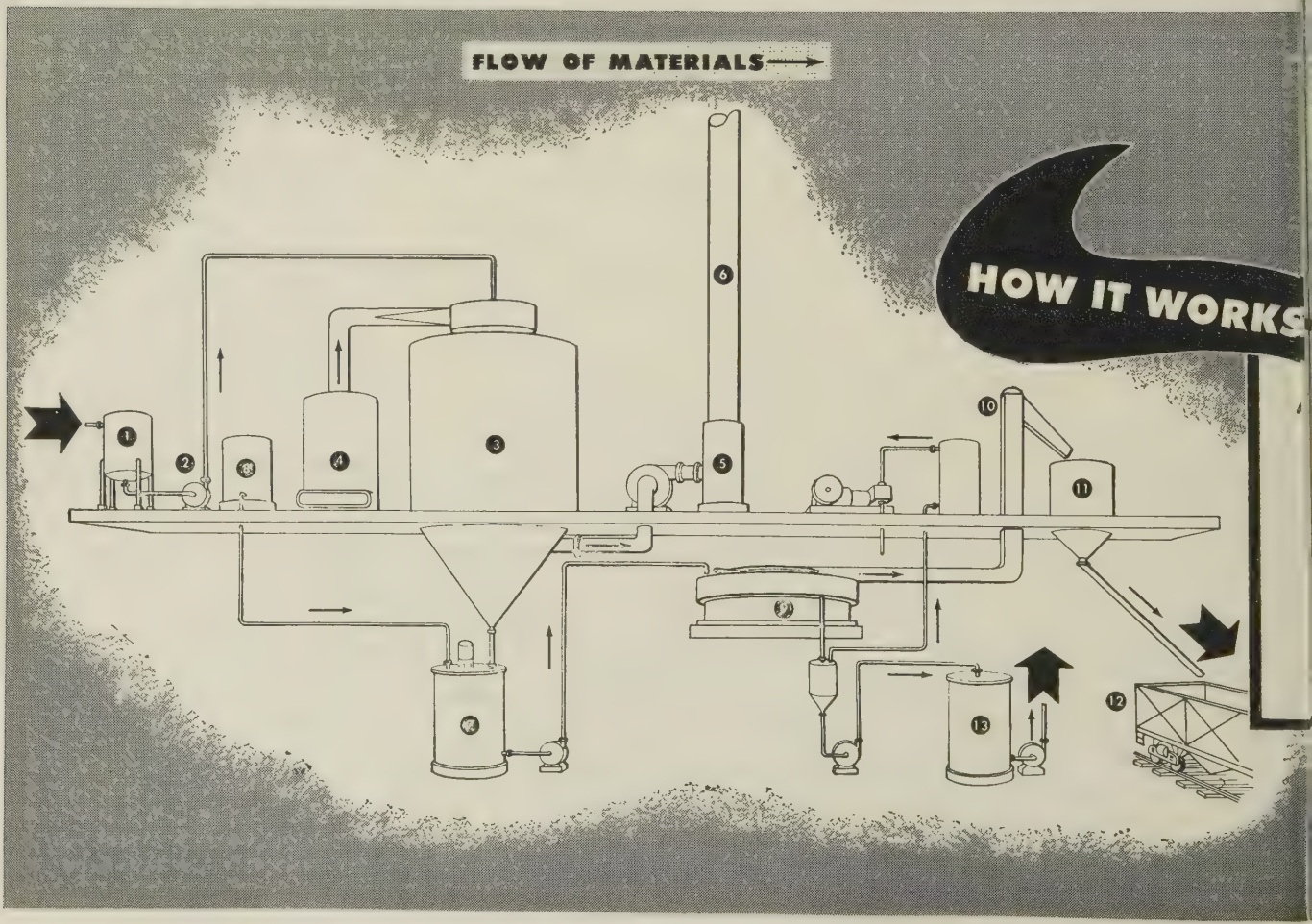
If you operate a

CUT ACID REQUIREMENTS

New continuous process, available from Koppers, of pickling acid used . . . and eliminates waste

FOR OVER A QUARTER OF A CENTURY, wherever a pickling line has been in operation, disposal of spent liquor has been a major headache. But now a new continuous regeneration process—the Koppers Inland-Zahn process— goes a long way toward solving this problem. This system is simple, it is economical, and *it has been proved in actual plant-scale commercial operation in Europe.*

With this process, the only make-up acid needed is the amount consumed in the pickling reaction plus normal losses. *All* available free acid in the used liquor is recovered (up to 50% of the original charge). Labor costs are low—just one man can operate the entire regeneration plant. As a result of these savings, operating costs are substantially below those of any presently available disposal method.



pickling line

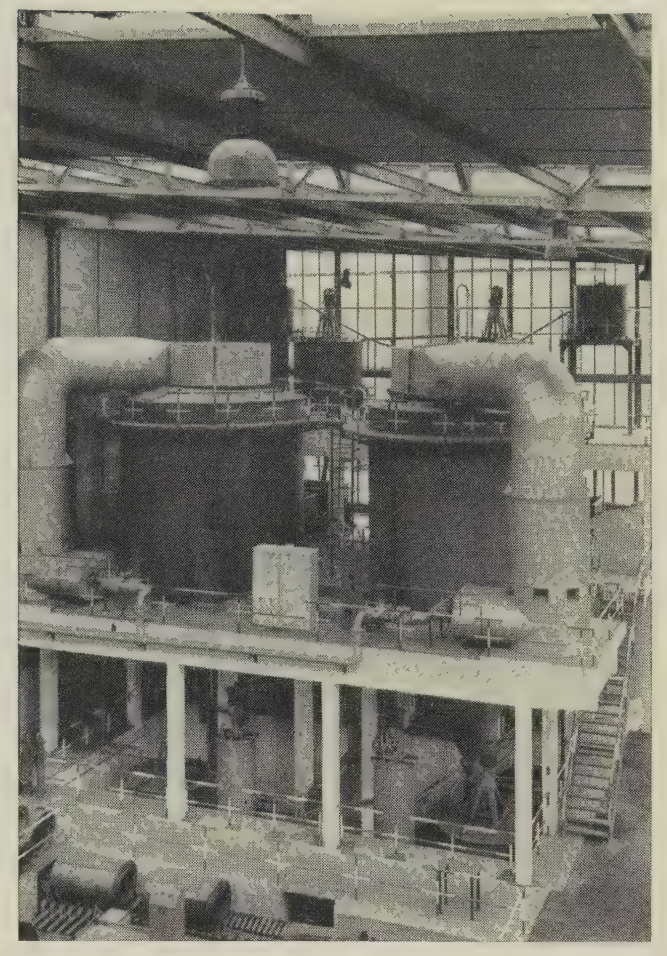
IN HALF!

regenerates up to half liquor disposal problem

PROVED COMMERCIALLY—This process, developed by Inland Steel Company and adapted commercially by Zahn & Co. of West Germany, is now being used successfully in three European steel plants. The benefits achieved include *extremely low maintenance* . . . and more uniform and *higher* acid concentrations in the baths. The latter advantage permits faster steel processing.

NEUTRALIZING PLANTS – The new regeneration process is especially applicable to plants handling 10,000 gallons of effluent, or more, a day. The Chemical Department of Koppers Engineering and Construction Division also designs and builds lime neutralization systems for both large and small pickling operations. Send the coupon for complete information about these and other Koppers Chemical Engineering Services.

Spent pickle liquor (1) is pumped (2) to spray head in an evaporating chamber (3). Here, hot air and flue gases from a combustion chamber (4) concentrate the liquor and cause the ferrous sulfate monohydrate to crystallize out of solution. Vapor laden air is discharged to atmosphere through a mist eliminator and stack (5 and 6). The slurry is dropped into a crystallizing tank (7) where fresh sulfuric acid is added from a metering tank (8). This causes more monohydrate to drop out. The slurry is then separated in a vacuum filter (9) and washed. Salt is conveyed to bins or hopper cars for sale or disposal (10, 11, 12). Mother liquor, containing about 35% acid and 1-2% iron, is pumped to a holding tank (13), ready for dilution and return to the pickling tanks. No reheating is required.



HEART OF THE SYSTEM—This spray dryer concentrates spent liquor to slurry of ferrous sulfate monohydrate crystals suspended in acid. The plant shown here, in Germany, has operated since June, 1954, processing 48,000 gallons per day of waste liquor.

GET ALL THE FACTS!

Koppers Company, Inc.
Engineering and Construction Division
1454 Koppers Building
Pittsburgh 19, Pennsylvania

I would like to receive literature on this new pickle liquor regeneration process . . . and also on Koppers other chemical engineering services. Please send the following:

- ☐ **Regeneration of steel pickling solutions by Koppers Inland-Zahn process.**
- ☐ **Lime neutralization of spent pickle liquor by Koppers.**
- ☐ **"3 Keys to Selecting Your Industrial Contractor," a brochure describing the variety of Koppers construction services and giving reasons why Koppers should build your next chemical plant.**

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KOPPERS

CHEMICAL ENGINEERING SERVICES

By LEON SALZ
Manager
Lubricants Div.
Magnus Chemical Co. Inc.
Garwood, N. J.

Here is an example of inadequate lubrication in a deep draw. You can spot such trouble by scratches, tearing, wrinkling, or buckling. Guide (Page 134) gives author's recommendations

Choose the Right Lubricant

Among factors you should consider are: Mechanics of drawing, die design and construction, physical condition of materials (workpiece and tools), and type of lubricant

PART ONE

INADEQUATE lubrication is the most frequent source of trouble in drawing.

A correct selection can overcome shortcomings in the design of punch and die, problems of metal quality and draw severity.

Here is practical information about lubricants, their composition and application.

Drawing—Metal parts are drawn from sheets, strip, or plates with tools powered by mechanical or hydraulic presses.

Tools have an upper, male section, called a punch, and a lower, female section, called a die. The punch forces a flat piece of metal into the die cavity, cold forming the required shape. Several operations and annealings are sometimes needed.

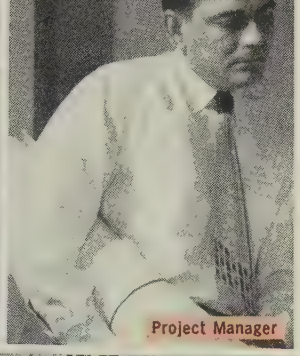
What Lubricants Do—They provide a film which reduces friction and wear.

When work pressures are low, straight mineral oil, general purpose soluble oil or dilute soap solutions are satisfactory. Greater pressures call for more oily (polar) compounds: Fatty oils, waxes, and concentrated soaps. They adhere to metal surfaces, maintaining a persistent film, 1 molecule thick, where other lubricants would be squeezed out.

Extremely high pressures raise work and tool temperatures and reduce oiliness. To prevent welding or seizure, some form of extreme pressure lubricant is required. Metal buildup, scratch marks and tearing are evidences of seizure.

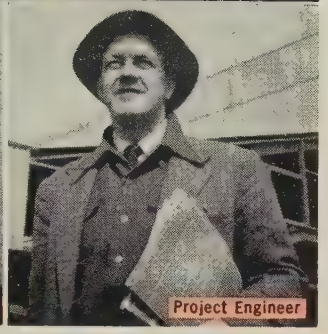
Two Film Types—Extreme pressure agents function mechanically or chemically. Chlorine and sulfur in the lubricant combine with punch, die, and work to form protective films highly resistant to welding. Powdered spacing agents (pigments) act as mechanical sep-


Field Accountant


Project Manager


Construction Foreman


Field Engineer


Project Engineer

ALL-PRO TEAM


Chief of Supply

Construction Superintendent

THE bedrock of an engineering and construction company is the corps of key men in key positions—permanent men whose skill and knowledge have been built up through years of experience in a wide variety of jobs. Pictured here are just a few of the men who make up the permanent organization of F. H. McGraw & Company: engineers, cost accountants, construction superintendents and foremen who have handled more than a billion dollars worth of engineering and construction in the past 28 years.

In all phases of construction, from preliminary design through finished building and mechanical installation, McGraw men have compiled an impressive record of achievement for the major firms in American Industry and for Government. McGraw men and machines are tooled and ready to take on any engineering and construction assignment. We would be happy to have a McGraw engineer call to discuss your construction needs—with no obligation, of course.

MEN OF McGRAW

The professional construction men who make up the McGraw team include some who have been with the company nearly a quarter of a century, and many who have nearly 20 years' service. Included are "pros" like Field Accountant "Patty" O'Brien, a 24-year veteran; Project Manager John Galley, 11 years; Construction Foreman "Bronco" Monacchio, 22 years; Field Engineer "Jiggs" Ossenfort, 16 years; Project Engineer George Fulton, 12 years; Chief of Supply Bob Moeller, 23 years; Construction Superintendent Mike Dykun, 19 years.

These men, and others like them, are veterans of major McGraw construction achievements for such clients as Ford Motor Co., U. S. Steel, Kimberly-Clark, Union Carbide, Westinghouse, General Aniline, U. S. Rubber and other leading industrial firms.

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arators between tool and work.

Rule — As work pressure increases, drawing compounds require increasing amounts of oiliness; severe pressure requires an extreme pressure agent.

Universal Factors — Any compound works on some jobs; on others, every one fails. Such behavior can be explained by: 1. Type of materials. 2. Their condition. 3. Severity of the draw. 4. Die efficiency.

Materials (tools and workpiece) are important. Hard tools resist welding better than soft ones. Tungsten carbide or chrome plating withstands metallic buildup longer than high carbon steels. Mirror finishes (diamond lapped) appreciably extend service.

Poor surface condition greatly increases drawing force. Abrasive oxides, dirt, scale, and hydrogen embrittlement ought to be avoided. Surface should be physically and near chemically clean and slightly rough to retain the lubricant.

Processing influences drawability. The order of such things as annealing, normalizing, spheroidizing, and patenting should be related to ductility and tenacity for top draws. They are usually associated with the larger grain sizes.

The drawability of metals varies considerably. High yield strength materials require greater forces for plastic deformation than those of lesser strengths. That leads to greater pressures on the lubricant. Stainless steels give the most trouble, followed by high carbon steel, low carbon steel, and brass.

Die efficiency is often overlooked. Construction, clearances and correct angles must conform to the metal limitations. Sharp corners cause localized, heavy drawing pressures, requiring heavy drawing oils.

Correcting the die cuts rejects and eliminates the need for a costly lubricant.

What Lubes Must Have—Those that perform best draw with a minimum of rejects and metallic buildup on the tool.

They must be physically safe: Don't use lubes containing white lead, carbon tetrachloride, chromates, or similar toxics.

Conventional sulfurized or chlorinated additives often are thought to be the cause of skin irritations. Although some persons are allergic to them, unhygienic conditions which breed bacteria (especially in water dispersibles) are a more common cause. Germicides solve the problem.

Corrosion—Rusting is the most common form. Water dispersibles account for most of it. You can minimize or eliminate the effects by increasing the ratio of product to water, adding an inhibitor or cleaning parts after drawing and applying a protective coating.

Operation	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum	Copper Brass Bronze
Stamping	1, 2, 3, 6, 7, 10	3 10, 11	4 11	2 6, 7	1, 2, 3, 6, 7, 9
Shallow Draws	3, 7, 10, 11	4 13	— 11, 13	— 7, 8	2, 3 7, 9
Deep Draws	4, 5 11	4, 5 11	— 11, 13	— 8, 11	3, 4 8, 11, 12

Lubricant Guide

(Check the numbers below that fit your job)

Water Dispersible Types

1. **Soluble Oil**—Forms a milky-opaque emulsion when added to water. It is prepared by adding emulsifiers to straight mineral oil. Heavy-duty types contain sulfurized or chlorinated compounds. Usual formulas range between 1 part oil to 5 parts water and 1 part oil to 20 parts water.

2. **Soap Solution**—This is a concentrated solution of potassium or sodium soap in water. It is rapidly soluble and self-cleansing. Slip qualities are excellent; uniform wetting provides unbroken film. Foaming is drawback.

3. **Nonpigmented, Soap-Fat Compound**—Consists of 35 to 60 per cent fat, plus soap and water. Product resembles mayonnaise. Performance is highly rated. Most popular for moderately severe draws. Usual mix ratios are between 1 to 1 and 1 to 5.

4. **Pigmented, Soap-Fat Compound**—Contains pigment concentrations of 10 to 50 per cent in soap, fat, and water. Made for severe drawing. Serious shortcoming is difficult removal.

5. **Dry-Film Soap**—Made principally of sodium soap and a water-soluble spacing agent, such as borax. Parts are immersed in a 10 to 25 per cent solution at 180-200° F for 3 minutes and air dried. Thin, dry, plastic film lubricates much better than aqueous solutions. Other advantages: Less mess, easy cleaning and handling. Drawbacks: You need special dipping and drying equipment; high humidity adversely affects the film. Chief uses: Refrigerator doors, bath tubs, gas cylinders.

Pencil cap like this one illustrates successive stages required in extreme drawing. Each one needs separate punch and die; chlorinated oils work well here

Green or blue stains on copper or its alloys are formed by free fatty acids. Solution: A lubricant with a free fatty acid content of less than 1 per cent.

White stains on aluminum or zinc come from the salts in alkaline water with a pH greater than 9. Water insoluble drawing oils are a simple solution.

Stability in Storage—Since lubricants are made several months ahead, they must keep well. Liquids shouldn't gel nor separate; solids must not bleed oil nor form crusts.

Inhibitors prevent rancidity in fats. Pigmented, soap-fat pastes must have sufficient body to prevent separation of dispersed solids.

Easily Applied—This feature is important to operators who work on incentive. A convenient method is continuous circulation. Lubricants should be nonfoaming. Other methods: Coated rollers, dipping, spray, and drip systems.

Easily Removed—Water or solvent degreasers are the most common cleaning methods. Choose the one that matches the lubricant.

Some plants limit the selection of drawing lubricants to those most easily cleaned or to those which can be removed by equipment on hand. That is a cart-before-the-horse procedure which can be more expensive than newer cleaning equipment.

Welding operations which follow drawing affect the choice of lubricant. Certain water-dispersibles are most suitable.

Over-All Economy—It's obvious that the cheapest lubricant isn't always the best. Be sure to consider production labor cost, reconditioning, tool life, cost of metal, and processing of rejects, press overhead, and cleaning.

• *An extra copy of this article is available until supply is exhausted. Part II appears next week. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, Ohio.*

Oil Types

6. Straight Mineral Oil—Any naphthenic type is satisfactory. Its viscosity must be between 100 to 300 Saybolt seconds at 100° F. Chemical stability isn't necessary nor is minimum-viscosity-temperature change of high paraffin grades. Advantage: Low cost.

7. Mineral Oil, Oily Blend—This is a mixture of straight mineral oil and 5 to 50 per cent oily materials. Fatty oils (polar compounds) are added to combat high pressures which break lubricant film of straight mineral oils; also, a little more expensive.

8. Straight Fatty Oil—Lard oil is most popular. Combats exceptionally high drawing pressures. Disadvantage: More costly than straight mineral oil.

9. Sulfurized Mineral Oil Blend (noncorrosive)—Made by mixing a mineral oil and from 5 to 50 per cent noncorrosive sulfur compounds. Usually found in draws of copper, brass, or bronze, it is less desirable than fatty oil because of its odor and color.

10. Sulfurized Mineral Oil Blend (corrosive)—The same as 9 except that the sulfur is quite active. Used extensively on carbon steels for extreme pressure applications. Not as expensive as 12 or 13.

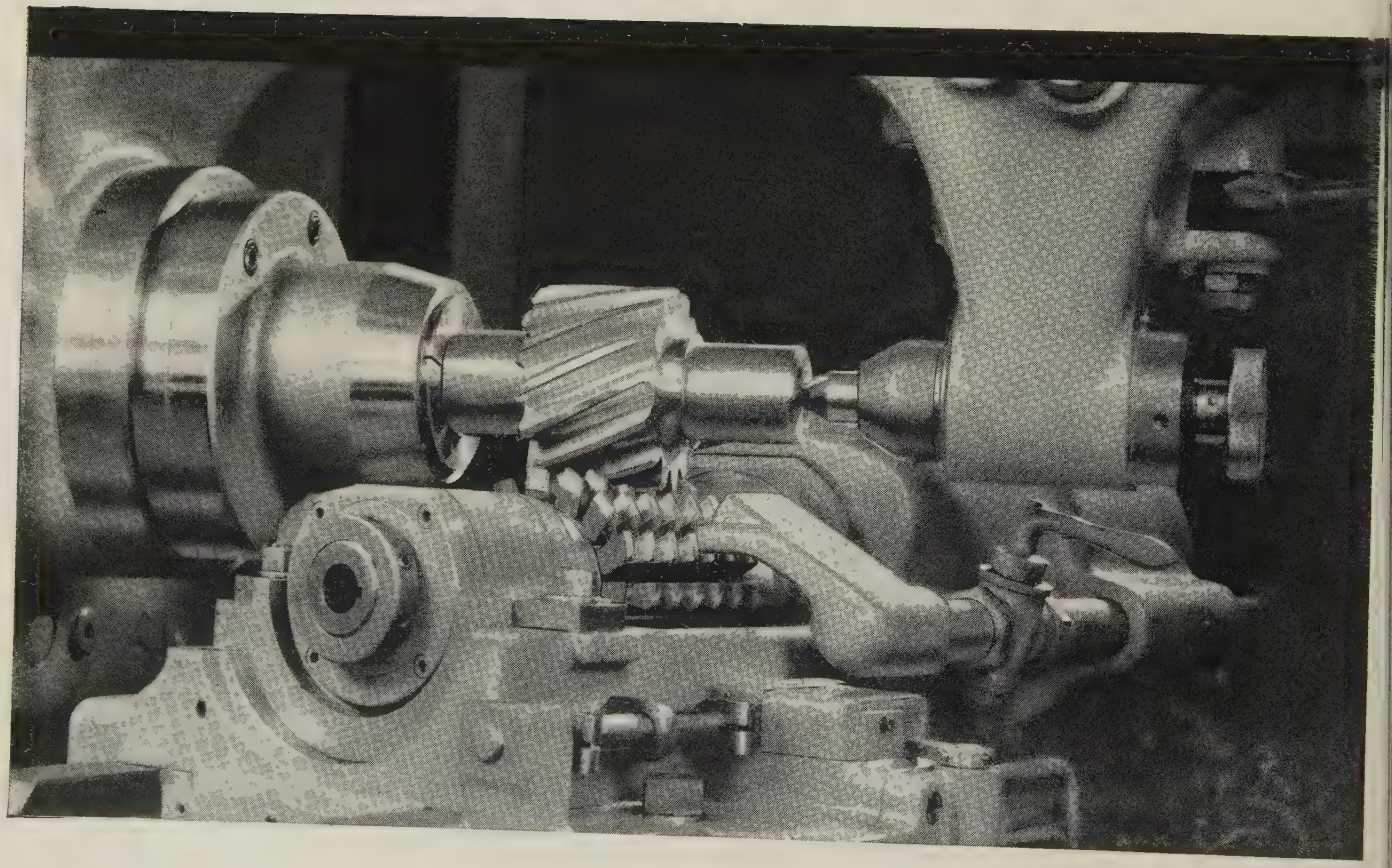
11. Chlorinated Mineral Oil Blend—Made by mixing mineral oil and from 5 to 50 per cent chlorinated oils. This lubricant is more satisfactory than sulfurized blends. It does jobs that sulfurized types can't do—much more universal. Cost is comparable.

12. Straight Sulfurized Oils—These complex compounds are made by reacting sulfur chemically with mineral oil, fatty oils, fats, fat derivatives, or terpenes. They are among the most expensive lubricants. For extreme pressure applications.

13. Straight Chlorinated Oils—These compounds are gaining popularity over straight sulfurized oils. Light colored, nonvolatile and syrupy, they are made from the reaction products of chlorine, hydrocarbons, fats, or waxes. Cost is about the same as sulfurized oils. Also used for extreme pressure applications.

crown hobbing

saves time and cost in producing accurately crowned gears



Crown-hobbing on this special Barber-Colman No. 14-15 Hobbing Machine is an ideal production method of generating crowned gear teeth. Where gears are now hobbed and then crown-finished in a secondary operation, they may be crown-hobbed in one operation. When a hobbed finish is satisfactory, the shaving operation can be completely eliminated. If the degree of finish required calls for a further finishing operation, such gears may be finished after crown-hobbing at less cost and in less time because hobbing provides uniform stock removal.

Crown-hobbing also makes it possible to hold a change in tooth thickness within the desired limits, and the tooth bearing can be located at the most desirable point consistent with the job conditions.

In the operation shown here, 4 DP., 14T, 18° P.A. transmission gears with 2¾" face are crown-hobbed on a special Barber-Colman No. 14-15 Hobbing Machine. Teeth are hobbed with a change in tooth thickness of .0045". The automatic cycle includes rough hobbing R. to L. at a given depth, automatic lowering of the work slide against the crowning cam, climb hobbing L. to R. at a constantly changing depth, and rapid traversing out of cut. No further finishing is required in this particular case, and the gears are completed in one automatic operation, without changing tools or transfer to other machines. Savings on this part can be expected on the basis of the following comparison:

typical gear-crowning	crown-hobbing
Rough hob gear teeth.	Manually unload and load.
Transfer to other machine.	Automatic cycle — rough hob.
Semi-finish hob gear teeth.	R. to L., set to finish depth,
Transfer to next machine.	and crown hob L. to R.
Crown-finish gear teeth.	Manually unload and load.

The machine can be designed to suit your job requirements, either as a single-purpose machine, or as a universal machine for both crown and conventional hobbing. Parts can be hobbed in one or two cuts, depending upon specifications of the part. The cam can be designed to produce the tooth configuration required.

The machine required for crown-hobbing is provided with a cam mechanism for raising and lowering the work slide to produce a change in tooth thickness. The work slide is held against the rotary cam by hydraulic pressure in addition to its own weight. Change gears are provided in the cam drive so that different amounts of change in tooth thickness can be produced with the same cam.

Send us drawings of your crowned-gears. Our engineers will analyze the job conditions and make recommendations for crown-hobbing.

BARBER-COLMAN COMPANY

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Hobs • Cutters • Reamers • Hobbing Machines • Hob Sharpening Machines

BARBER COLMAN

Here's how a ranking Air Force officer sums up future requirements for the aircraft and missile industries:

1. MORE CASTINGS: Less aluminum, more high strength steel.
2. MORE EXTRUSIONS AND FORGINGS: Priority goes to steel, titanium, and beryllium.
3. MORE SANDWICH STRUCTURES: Steels will gain over nonferrous.
4. NEWER MACHINING METHODS: Electrospark, numerical controls, and surface speeds of 30,000 to 50,000 fpm.
5. CLOSER SHEET TOLERANCES: Greater width, length for stainless; rolling mills will stay within 25 per cent of present tolerances.
6. MATERIAL STORAGE: Rare alloys will require vacuum or controlled atmospheres.

Metalworking Tomorrow

Supersonic airplanes and hot missiles force designers to use many hard-to-work metals. Here is a rundown of current developments and a few trends appearing on the horizon

THE predictions above were made by Col. John N. Dick, chief of manufacturing methods, Industrial Resources Div., Air Materiel Command, Wright Field, Dayton, Ohio.

The occasion was a regional steel conference of the American Steel Warehouse Association at Glenwood Springs, Colo.

Here is the substance of Colonel Dick's thinking about the effects of supersonic aircraft and guided missiles on tomorrow's industrial picture:

Castings—They offer the closest approximation of the finished piece. Holes can be cored, undercuts made, and draft angles eliminated or held to a minimum. Such advantages reduce machining and chip production and permit use of general rather than expensive, single purpose machine tools.

A landing gear door is a good example. A one piece magnesium casting replaced 55 aluminum stampings joined by 1600 rivets.

In another case, a landing gear fork, made as a single casting, replaced three aluminum forgings. The switch increased strength 5 per cent and cut weight 25 per cent.

Steel Advantages — The Air Force has casting alloys with tensile strengths of 200,000 psi. They are working toward 300,000 psi. Parts cast in such alloys are stronger and lighter than equivalent aluminum forgings.

Methods—The ideal casting requires only hole drilling and facing off of mating surfaces. Today's methods come far closer to that ideal than most people imagine.

Special sand with an inorganic binder can produce accurate, smooth surfaces. Thermosetting resin, mixed with fine-grain sand and applied to a hot pattern makes greatly improved shell molds. Beyond that, pure ceramic molds, fired at extremely high temperatures, leave casting surfaces as smooth as chinaware.

There will be great emphasis on vacuum or controlled atmosphere casting. The processes greatly improve the physical properties of cast metals.

Future Equipment—Colonel Dick feels that the casting industry must solve many unusual problems in the next few years. New melting and molding equipment will be delicate and more expensive than that used today. New molding materials and rare alloys will require vacuum packing, or storage in sealed containers, or controlled atmospheres.

Typical of such unusual equipment is the electron beam vacuum furnace developed by Temiscal, Richmond, Calif. It uses an electron beam from tungsten filaments heated by high voltage. Metal is fed from the top, melts in the electron beam, and drips into a copper crucible where it freezes. Withdrawal of solidified metal is continuous.

Extrusions, Forgings — The newer ones must be able to meet higher operating temperatures and stresses without appreciable sacrifice in lightness. Such specs call for titanium, steel, beryllium, and a host of "new and exotic" materials, says Colonel Dick.

Forgers are working on the problems of reducing scale formation on such metals. There is some

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uality carbon, alloy and stainless steels with the best service in the dustry are our guarantee to each customer. We start with a quality roduct—AMBALLOY steels—then follow up with a firm delivery ate that gets your order where you want it, when you want it, fast. But the Byers service policy extends beyond delivery. High grade onversion facilities are an important part of our program. We also offer a personalized technical service through our highly-trained corps of metallurgists.

Ninety-three years of producing ferrous metals have familiarized us with many of your problems. So check Byers first for your steel requirements. Write for new catalog. A. M. BYERS COMPANY, Clark Building, Pittsburgh 22, Pennsylvania.

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TOMORROW . . .

evidence that high energy rate forming (Example: Explosive forming at 20 times present pressures) will lick the problem.

Sandwiches — This type construction permits designers the use of steel and its alloys in aircraft and engines with no sacrifice in added weight (see Page 116). Main drawbacks are brazing methods, materials, equipment.

Two principal types will stand out: Honeycomb and corrugated cores. They are made from foil 0.001 to 0.003 in. thick. Facing sheets are 0.006 to 0.030 in. thick.

Machining — Emphasis on tape controls stems from the increased productivity such tools display compared with those in use now. Other benefits: Shorter setup time, increased accuracy, convenient storage of skills, less scrap.

Electrospark machining, says Colonel Dick, also looks promising. There seems to be no limit to the complexity of forms it can handle. Metal hardness merely improves usefulness—the harder the metal, the better it works.

Some of the newer high strength materials are almost impossible to machine. Tests at Lockheed indicate that ultra-high-speed machining with explosives may be a way around that problem.

The Air Force is supporting a project to investigate machining at speeds between 30,000 and 50,000 fpm. In initial experiments, the workpiece is a projectile which is shot across a tool bit.

The colonel emphasized that he expects critical velocity for high speed machining will be 100 times those now in use.

Rolling Mills — Tomorrow's airframes will be made of stainless, alloy steel (5 per cent chrome series), and titanium sheets. Here are the specifications:

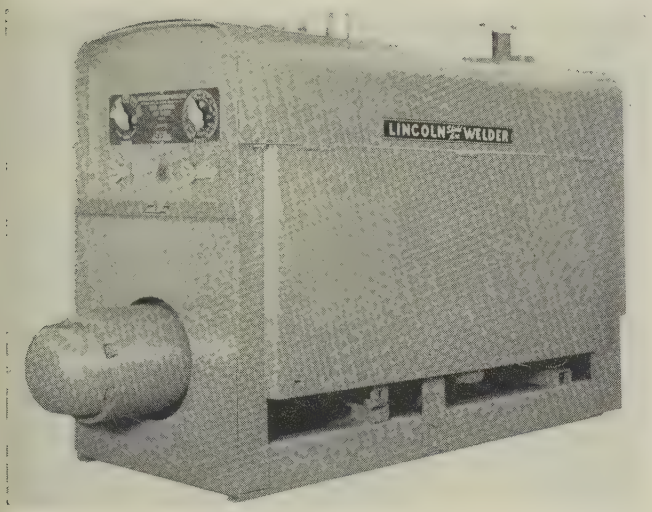
1. Thickness: 0.010 in. up.
2. Size: 48 by 240 in. (minimum).
3. Condition: Heat treated flat.

The longer and wider sheets are needed for better load distribution and weight reduction.

Mills are considering new equipment that will produce flat rolled stainless sheets to 25 per cent of present commercial tolerances.

Some equipment is in the development stage. It is expected to hold flatness to within 1 per cent.

Portable Arc Welder Has Dual Controls for Generator Output



The K-6090 is rated 200 amperes at 40 volts and 60 per cent duty cycle. It has an electric outlet which provides 1 kw of auxiliary power (direct current).

The welder has a five step, selective current control and a continuous voltage control which also provides fine adjustments in the current.

The ranges of the steps on the selective current control overlap, so that it is possible to obtain either a high or low open circuit voltage for any current.

The gasoline engine which drives the welder develops 36 hp at the 1450 rpm operational speed of the welder.

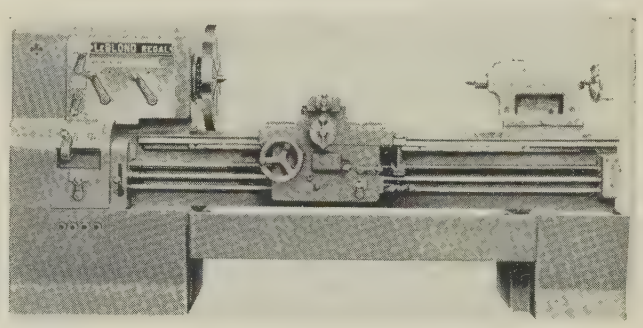
The auxiliary power, 115 volts direct current, may be used for power tools or for lighting. *Write*: Lincoln Electric Co., 22801 St. Clair Ave., Cleveland 17, Ohio. *Phone*: Ivanhoe 1-8100

Lathe Headstock Uses Gear-Belt Drive

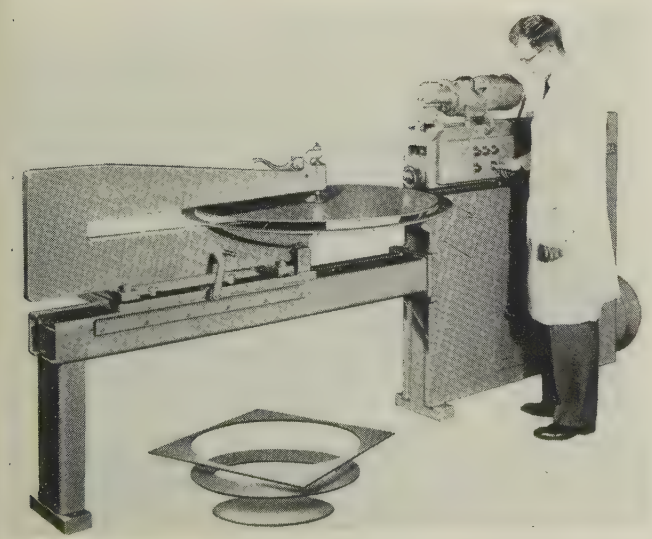
The 21 and 24-in. Regal lathes are powered by 7½-hp motors. A 10-hp motor is available for high speeds.

The bed has hardened and ground steel ways that can be replaced. They are fitted according to the compensating V-way principle to provide better distribution of forces.

Both feed rod and preloaded lead screw are provided to insure continued accuracy in thread chasing. *Write*: R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio. *Phone*: Jefferson 1-0910



Ring and Circle Shear Can Cut ¼-In. Mild Steel



Model 33 RC cuts circles, circular holes, and rings. It eliminates the hand feeding of cutters into plate.

A power downfeed drives the upper cutter into the material automatically as the cut progresses. The cutter can be stopped at any depth, and overtravel of the cutter, in either direction, is prevented by limit switches.

Cutting can be started at any point within, or from the edge of, the blank.

A self-compensating circle arm floats on guided ways to maintain true center automatically despite varying thicknesses and types of materials.

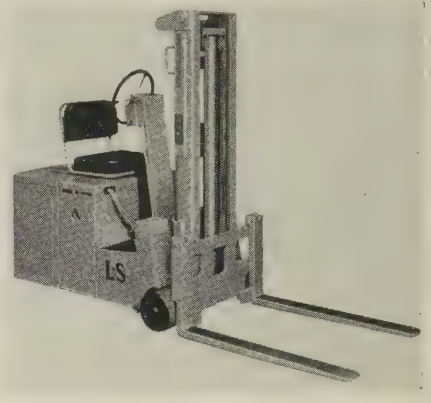
An adjusting crank quickly positions the circle arm for cutting various diameters. High carbon, high chrome cutters are used. *Write*: Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N. Y. *Phone*: Taylor 4070

NEW PRODUCTS and equipment

Fork Lift Truck

Model H has a 24-volt electrical system and is built for continuous operation and frequent stopping and starting.

A rear wheel drive enables the truck to turn in its own length. The turning radius is 56¼ in. The truck can stack loads 48 in. long in aisles 9¼ ft wide.



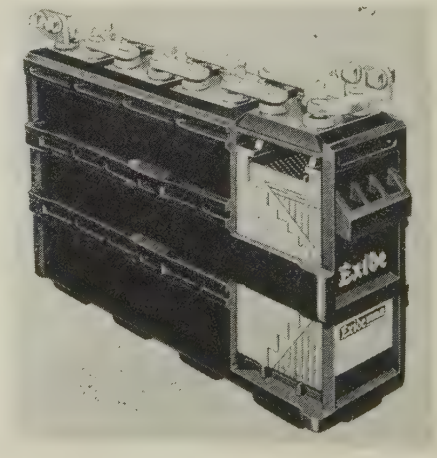
The truck comes in four standard capacities: 1000, 1500, 2000, and 2500 lb. Collapsed heights of all units are either 68 or 83 in. Fork elevations are 102 and 132 in.

There are three speeds in both forward and reverse. *Write:* Dept. R-18, Lewis-Shepard Products Inc., 125 Walnut St., Watertown 72, Mass. *Phone:* Watertown 4-5400

Cranking Battery

The MGD Exide-Ironclad is a diesel locomotive battery available in molded hard rubber trays in two sizes. One has 19 plates, the other 13 plates. Capacities are 420 and 280 ampere-hours at an 8-hour discharge rate.

The battery uses armored, po-



rous tubing to encase the grid spines and active material of the positive plates. The tubing acts like a highly efficient filter, facilitating electrochemical action. It prevents loss or shedding of active material.

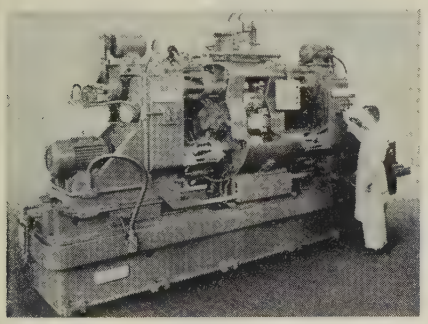
Positive plates are made of an alloy of silver, lead, and other materials which give high resistance to electrolytic corrosion.

Heavy copper inserts in terminal posts and cell connectors assure high sustained voltage during cranking. *Write*: Dept. MGD, Exide Industrial Div., Electric Storage Battery Co., Box 8109, Philadelphia 1, Pa. *Phone*: Locust 4-4030

Special Machine

This trunnion-type machine has two ways and five stations. It is a semiautomated unit that drills, core drills, reams, and taps four groups of rock bit holder parts.

Work fixtures are mounted on a trunnion that is indexed to five positions between opposed way-type machining units.



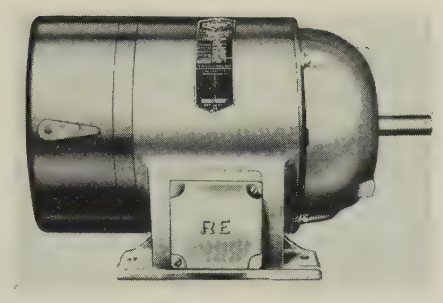
Both machining units have single spindle, lead screw tapping units. One machining unit has a nine-spindle head, the other a ten-spindle head. Holes up to 1½ in. in diameter are drilled and reamed.

A 20-hp motor powers the multiple spindle drill head. *Write*: Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich. *Phone*: Lorain 7-0123

Brake Motor

The Brakemotor is a single-frame unit which combines a wafer type brake with a drive motor.

The brake's "doughnut" type magnets permit the shaft to be extended through it.



Drive motors in NEMA frame sizes 182 through 326U have continuous duty ratings of 3, 6, 10, 15, 25, and 50 ft-lb. Intermittent ratings are 3, 6, 10, 15, 25, 35, 50, and 75 ft-lb. *Write*: Reuland Electric Co., Alhambra, Calif. *Phone*: Cumberland 3-4171

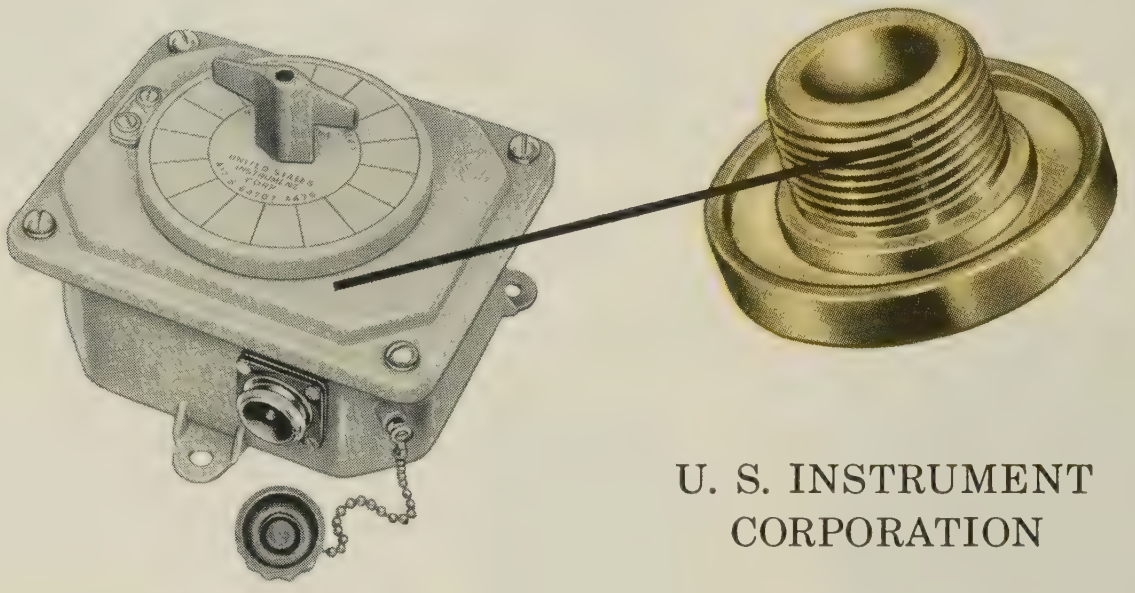
Radial Drill

This line of drilling machines is offered with three optional head designs. The Lever-Shift, the standard model, controls all 36 spindle speeds and 18 power feeds manually.

The Partial Preselect model combines hydraulic control of all 36 spindle speeds with manual con-

Three more nationally known manufacturers select Mueller Brass Co. Forgeable Bearing Alloys for vital components of their products

In ever-increasing numbers, Mueller Brass Co. specialized alloys are being specified by manufacturers of top-quality products. In a series of continuing advertisements, we have presented case histories of successful applications, to which we now add three more distinguished companies who are incorporating Mueller Brass Co. forgeable bearing alloys in their products to meet the demands of widely divergent operating conditions.



U. S. INSTRUMENT CORPORATION

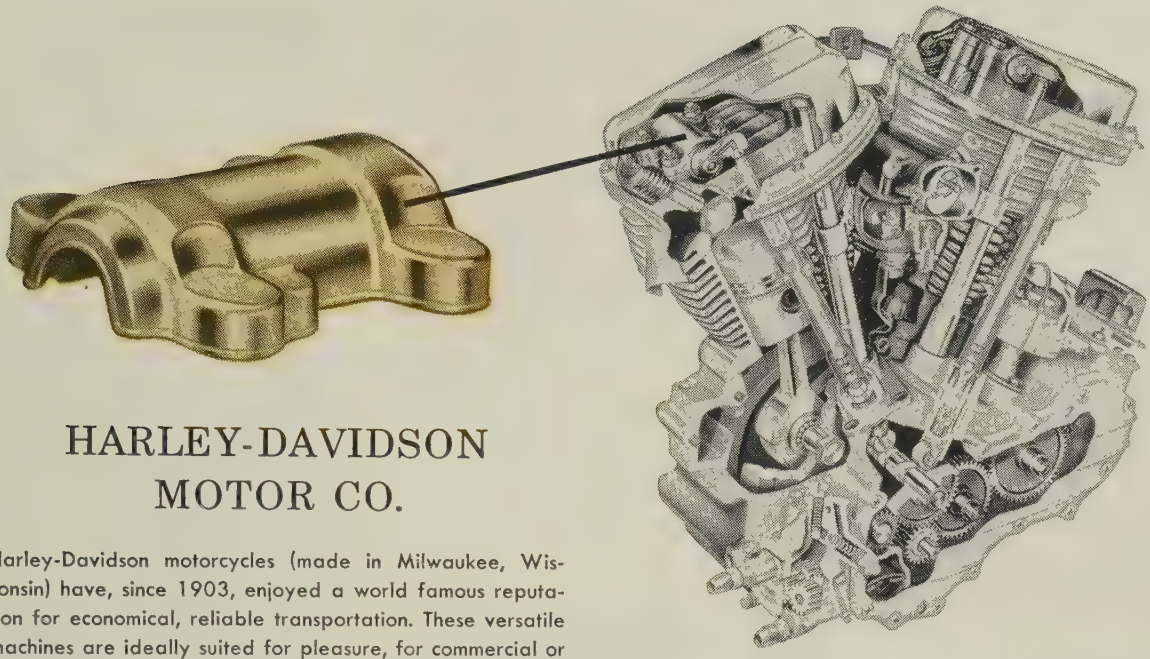
U. S. Instrument Corporation, Charlottesville, Va., selected abrasive-resistant Mueller bronze alloy bushings for their remarkable telephone selector switches after exhaustive tests of many materials. A vital communications link on today's U. S. Naval vessels, these sound-powered telephone circuits must meet rigid Navy performance-standards. Such phones, for example, must have selector switches which are capable of rotating for a minimum of 50,000 torturous cycles . . . 360° clockwise, followed by 360° counter-clockwise. In addition, the "O" ring must still form a water-tight seal AT THE END OF THE TEST! Of the many tested, a Mueller Brass Co. special manganese bronze alloy was the best one meeting these rigid specifications.

There were other important reasons why these bushings were chosen by U. S. Instrument Corporation for this application. Resistance to abrasive action against the rubber "O" ring was a prime one . . . then, too, the stem assembly suffered severe pounding through the action of the indexing mechanism which, prior to the use of the Mueller Brass Co. alloy, caused repeated seizure of the component parts. In this particular application, the part was fabricated on an automatic screw machine rather than produced as a forging. The versatility of Mueller Brass Co. alloys makes them readily adaptable to the most economical method of fabrication dependent upon the size, shape, and end-use requirements of the part.

In commenting on the success of this part, U. S. Instrument Corporation praised the alloy for its tensile strength (ordinary brasses could not withstand the 2000 ft. lb. impacts without deformation), for its machinability and corrosion-resistance.

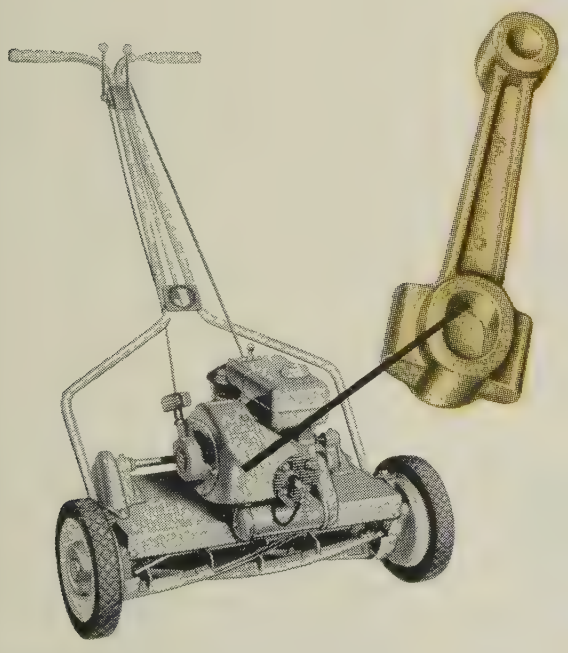
40 MUELLER BRASS CO

MUELLER BRASS CO.



HARLEY-DAVIDSON MOTOR CO.

Harley-Davidson motorcycles (made in Milwaukee, Wisconsin) have, since 1903, enjoyed a world famous reputation for economical, reliable transportation. These versatile machines are ideally suited for pleasure, for commercial or business use, as well as the grueling demands of law enforcement work. Harley-Davidsons boast a dependable engine . . . one which can roll up an astounding mileage record with little or no care. The painstaking selection of every engine component is one important reason for this reliability. The new twin-cylinder Harley-Davidson 74 OHV employs Mueller Brass Co. bronze alloy forgings in the form of rocker-arm bearing caps. Subjected to violent temperature changes, fast starts and stops and road shock, Mueller forgings are proving again and again that they have the ability necessary to withstand almost any punishment . . . and still provide unfailing service.



JACOBSEN MFG. CO.

Jacobsen Mfg. Co., Racine, Wisconsin, was among the first to produce a practical power mower for home use. That was more than 35 years ago! Today, Jacobsen power-mower dependability is evident itself in more than a dozen gleaming new models such as the popular Pacer, Lawn Queen, Manor and others. One of the most reliable components in the always dependable Jacobsen hi-torque engine is a Mueller Brass Co. connecting rod forged from special bronze alloy. Jacobsen mowers with Mueller-forged connecting rods are called upon by some commercial users to operate as much as 8 hours daily, 6 days a week . . . perhaps as much as 2000 hours a year. In searing summer temperatures, thru hours of constant operation, the high uniform strength of Mueller bronze forgings constantly withstands pounding and vibration with the same conspicuous success as in its many other applications.

Why not investigate these specialized alloys for your own products. We welcome your inquiries. Our engineering staff will be happy to make specific recommendations. Both on the proper alloy and the best method of fabrication to meet your needs . . . exactly. Our engineering manuals show many, many examples of how American manufacturers have used these alloys to great advantage.

● WRITE TODAY FOR THE ENGINEERING MANUAL YOU NEED

Mueller Brass Co. Forgings
Engineering Manual H-58565 ☐

Tuf Stuf Aluminum Bronze Alloys
Engineering Manual H-58563 ☐

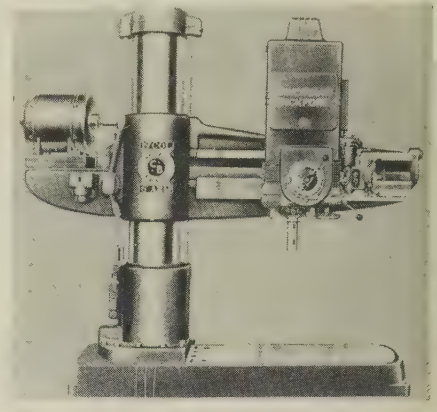
"600" Series Bearing Alloys
Engineering Manual FM-3000 ☐

Copper Base Alloys in Rod Form
Engineering Manual FM-3010 ☐

227

P O R T H U R O N 2 6 , M I C H I G A N

trol of the 18 power feeds. The Complete Preselect model hydraulically changes all 36 spindle speeds and 18 power feeds. They are controlled by two dials.



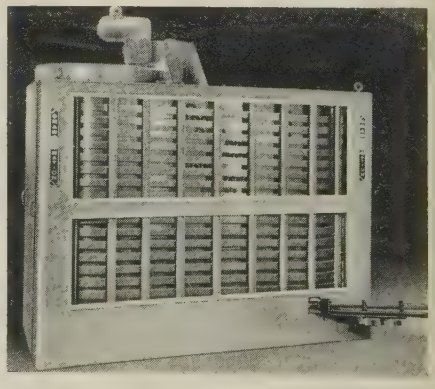
The machine has a declutchable, herringbone driving gear which provides the power to drive large diameter drills and heavy cutting tools. The gear is declutched for small drills and taps which require high spindle speeds and quick reversals.

The machines are available with 13, 15, 17, and 19 in. diameter columns; 4, 5, 6, 7, and 8 ft arm lengths; spindle speeds up to 2300 rpm; and power feeds from 0.004 to 0.125 in. with six positive geared tap leads. *Write*: Cincinnati Bickford Div., Giddings & Lewis Machine Tool Co., Cincinnati, Ohio. *Phone*: Elmhurst 1-1700

Storage Unit

This store-and-feed unit is custom-tailored to automated processing lines. It offers a true demand-feeding system from a controlled mobile-storage medium.

The illustration shows a unit which stores and feeds gear blanks



NEW PRODUCTS and equipment

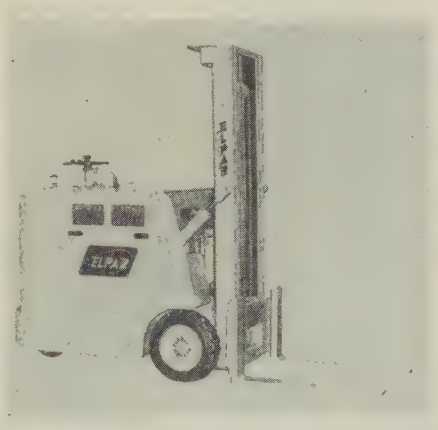
with a 2 in. OD. Storage capacity with a part of this size is over 2500 units.

Parts are kept moving by the motion imparted from two rubber belts rotating lengthwise in the unit. The belt surface is vertical. *Write*: Gear-O-Mation Div., Michigan Tool Co., 7173 E. McNichols Rd., Detroit 12, Mich. *Phone*: Twinbrook 1-3111

Fork Truck Is Fast

The electric-powered Model F-38T2 has a maximum travel speed of 6½ mph and a lifting speed of 72 fpm.

The truck has a short turning radius and 360-degree steering.



All speeds are controlled by the operator's foot; his right hand is free to control hoisting and tilting. *Write*: Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio. *Phone*: Utah 1-6200

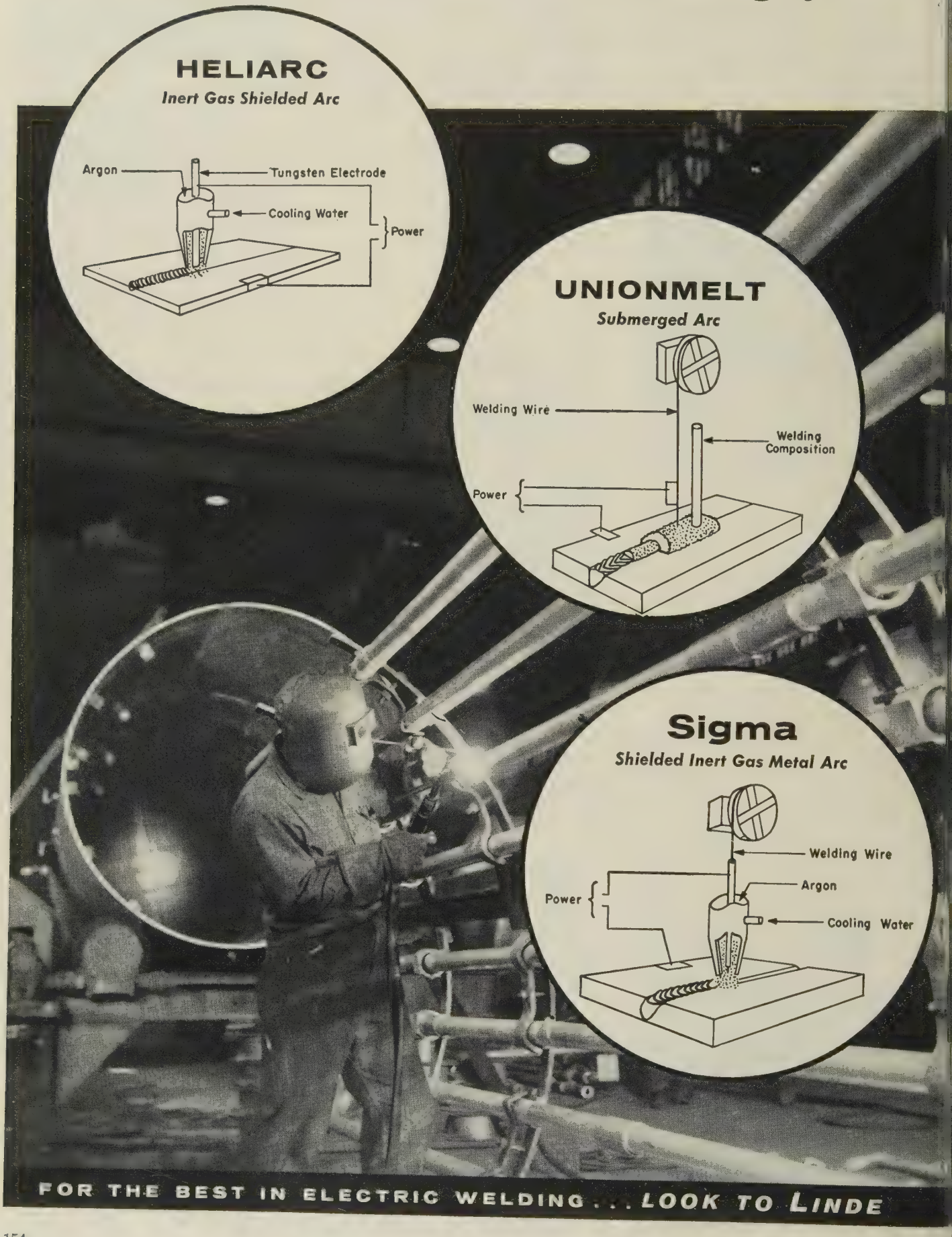
Optical Comparator

Model 167 is a device for comparing objects and determining the difference between them. It can be used to superimpose an assembly drawing on a work surface for quick and accurate assembly of small parts.

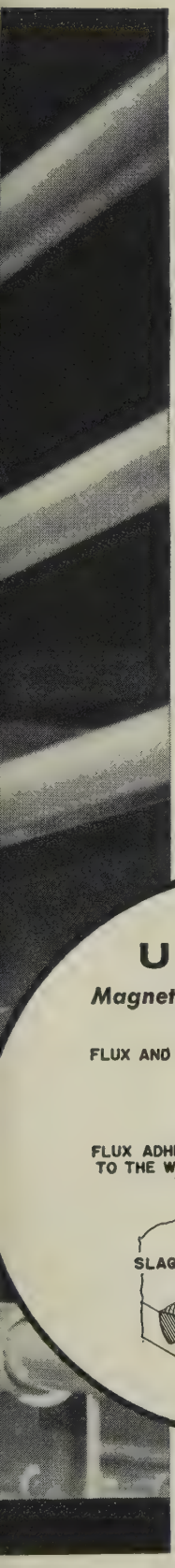
The comparator can be adapted for three dimensional objects. Applications include the comparison of master forgings with specimens in various stages of manufacture and the periodic checking of forging dies against a master.

When two objects to be compared are inserted, their images (one pink and one green) are

For any of your welding jobs



. . LINDE can supply the *right method!*



Inert gas shielded arc welding—

HELIARC Apparatus for inert gas shielded arc welding, using a tungsten electrode and a shield of LINDE argon, is tops for joining hard-to-weld commercial metals. On stainless steel and aluminum, HELIARC Welding is fast and clean, producing high-quality welds that resist corrosion. HELIARC Welding eliminates costly grinding and finishing, making it a valuable method for quantity production of hard-to-weld metals.

Submerged arc welding—

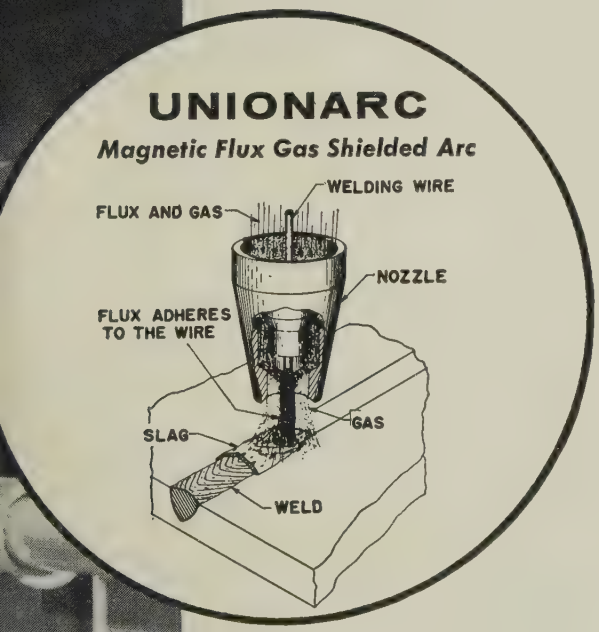
Shapes made of materials ranging from light gage to heavy plate, adaptable to mechanization, can be most economically joined by UNIONMELT Welding. It is used on low and medium carbon steels and alloy steels, including those containing chrome and/or nickel. UNIONMELT Welding is also used extensively for resurfacing metal, providing extra wear and corrosion resistance. UNIONMELT Welding is fast and inexpensive on production jobs.

Shielded inert gas metal arc welding—

One of the most versatile welding methods is Sigma Welding. LINDE's Sigma apparatus, using a shield of LINDE argon, is ideal for manual welding of commercial metals $\frac{1}{8}$ in. or more thick, and for automatic operation on lighter gage metals to .050 in. Highest quality welds can be made on aluminum thicker than $\frac{1}{8}$ in. at speeds up to 16 inches per minute. Build-up and surfacing jobs are also improved by using LINDE's Sigma welding method.

New! Magnetic flux gas shielded arc welding—

UNIONARC Welding, LINDE's most recent development in electric welding, is an extremely fast method for welding mild steel. This method employs a continuously-fed, bare steel wire electrode, magnetically coated with flux conveyed in a stream of carbon dioxide shielding gas. Manual welds can be made easily in any position—vertical, overhead, downhand—with no stops to change electrodes. The speed, versatility, and ease of operation of of UNIONARC Welding brings costs down 25% to 65% below those of manual covered electrode welding. Clean, smooth, high-quality welds are provided, even in the presence of moderate amounts of rust, scale, and moisture.



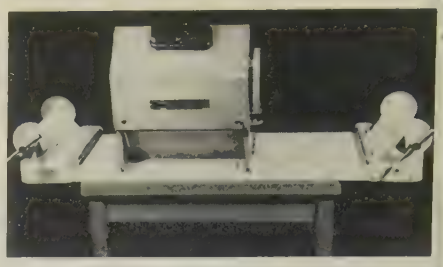
Engineers at LINDE have been designing, developing, and testing electric welding methods and apparatus for many years. Help on any welding method is yours for the asking. You can improve your work and cut production problems by taking advantage of LINDE's experience. For data on UNIONARC Welding or any other electric welding method, call the LINDE office nearest you.

LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. Offices in other principal cities. *In Canada:* Linde Company, Division of Union Carbide Canada Limited.

Linde
TRADE-MARK

UNION CARBIDE

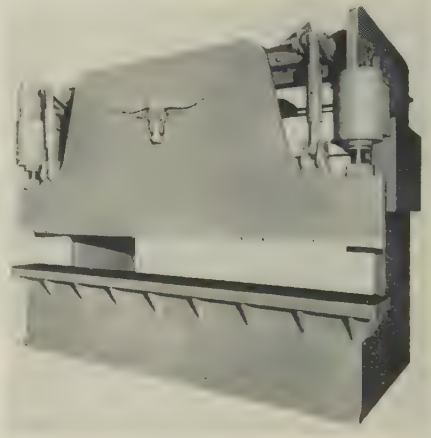
NEW PRODUCTS and equipment



transmitted to the viewing area by an optical system. Turning knobs superimpose the two images. Where the objects are identical, the operator sees a black and white image. Where they differ, the image remains pink or green. *Write*: Engineering & Optical Div., Perkin-Elmer Corp., Norwalk, Conn. *Phone*: Victor 7-2422

Hydraulic Presses

The Longhorn line of presses includes models of 160 to 1500-ton capacities.



The presses are designed to handle all metal forming operations. All units are equipped with NEMA 12 or JIC standard electric circuits. *Write*: Perry Co., P. O. Box 2057, Waco, Tex. *Phone*: Plaza 6-2137

Vacuum Induction Furnace

The FIM-300 is a melting furnace with a chamber 8 ft long and 5 ft in diameter. The standard model has a capacity of 200 lb, but this is easily increased to 300 lb by adding a second diffusion-ejector pump.

Standard equipment includes a 2900 liter per second diffusion-ejector pump, a 310 cfm mechanical pump, two observation win-

Let me show you how one of our P & J Automatics

put this

"PROBLEM" Job on a PAYING BASIS!

Some of the toughest machining jobs you'll ever have to handle get that way, *not* because of any *single* factor like extra-hard metal or really heavy cutting, but because of *several* contributing factors that can add up to a lot of machining time and a big profit loss. The job shown here . . . which one of our customers brought in recently . . . is a good example. A glance at the "Job Facts" will show you a combination of factors that could easily have made this job a real problem. The most difficult of these requirements was machining the bevels . . . which had to meet close tolerances for size and conformity to the true angle and, in addition, demanded a fine finish with *no* tool-return marks permitted. However, handling this part on a Potter & Johnston 4-U Automatic, with a tooling set-up engineered by P&J Tooling Specialists, put this potential headache on a high-output, high-profit basis.

HERE ARE THE JOB FACTS:

PART: *Bevel Gear*

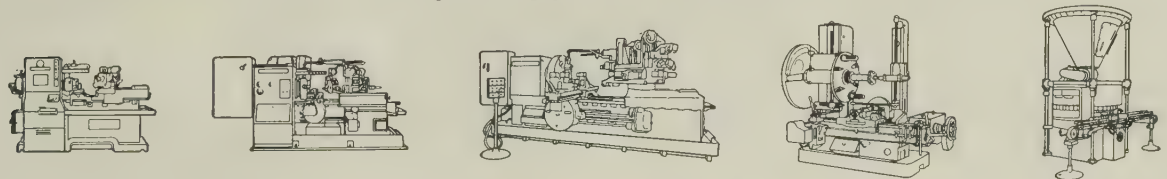
MATERIAL: *Steel Forging, 190 Brinell*

MACHINING REQUIRED: *22 separate roughing and finishing cuts including several hard-to-handle angle cuts.*

SPECIAL REQUIREMENTS: *Hold bevel angles to close tolerances and produce a good finish.*

RESULTS: *A part finished every 13 minutes floor-to-floor time . . . on a P&J 4-U Automatic!*

A new P&J Automatic can put *your* problem jobs on a paying basis too! Send me your sample prints and I'll show you how a P&J Automatic with P&J Tooling can help you turn out your toughest jobs faster, better and at lower cost. Write Potter & Johnston Company, Pawtucket, Rhode Island.



AUTOMATIC TURRET LATHES . . . GEAR CUTTERS . . . GILDA PACKAGING MACHINES

POTTER & JOHNSTON

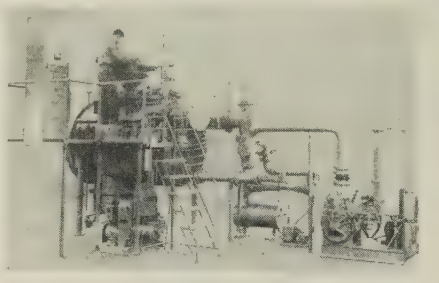
SUBSIDIARY OF PRATT & WHITNEY COMPANY, INC.

PRECISION PRODUCTION TOOLING SINCE 1898

NEW PRODUCTS and equipment

dows, a bridge breaker, and a sight tube.

The mold well is flanged and can be constructed at any desired depth. It is readily interchanged with bolt-on accessories.

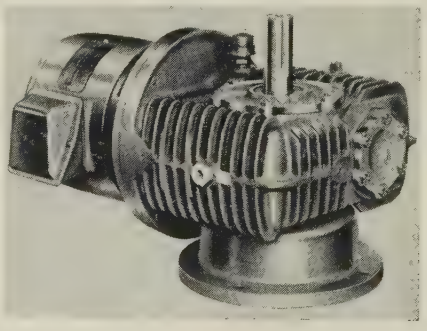


The 36-in. diameter of the mold well makes it easy to pour large molds or to add an accessory mold table. The standard well accommodates molds 48 in. high. The mold table permits 42-in. molds.

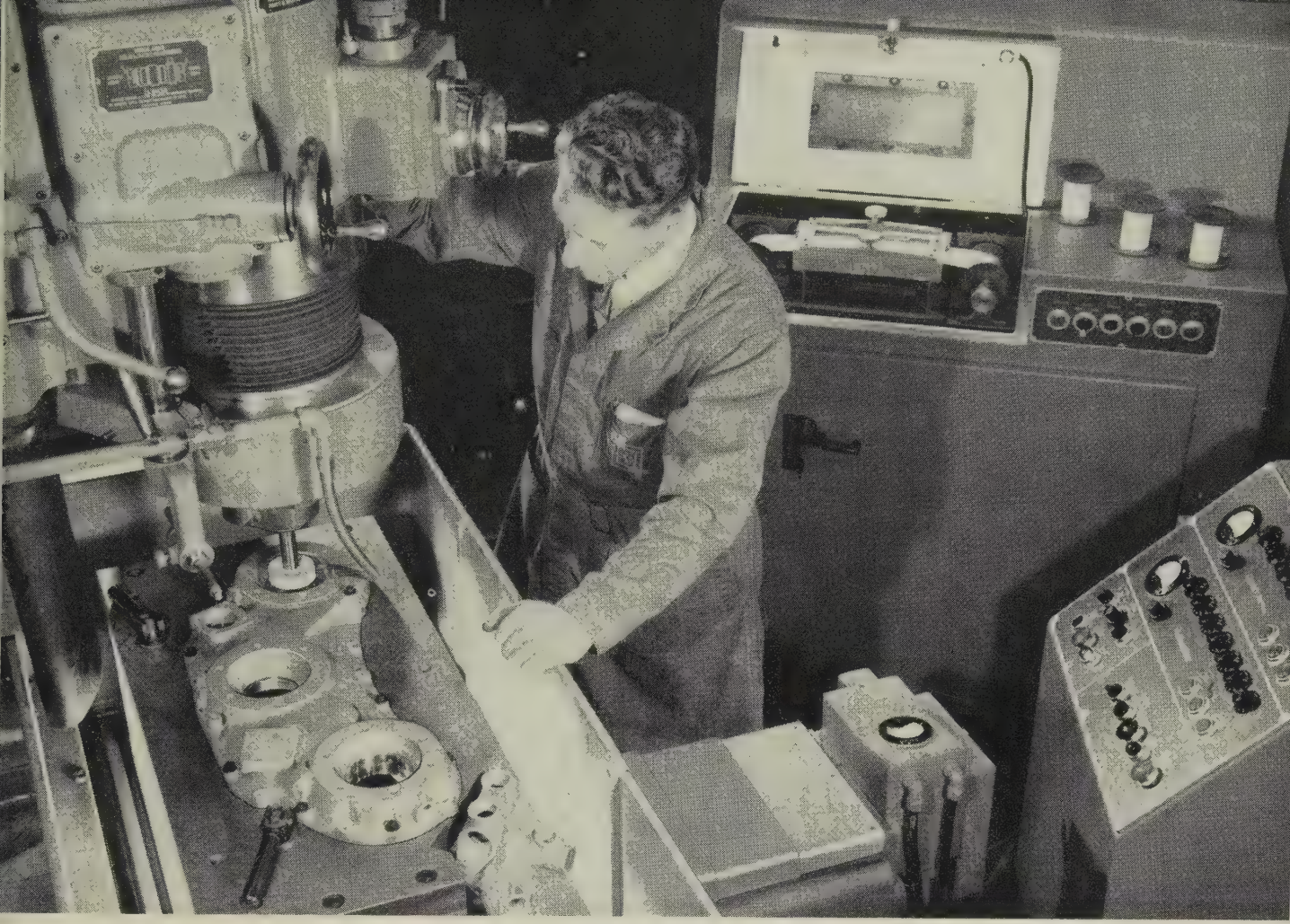
There are four independently controlled charging cups for alloy addition or base charging. They have a combined volume of 268 cu in., equal in volume to a nominal 50-lb crucible. *Write*: Rochester Div., Consolidated Electrodynamics Corp., 1775 Mt. Read Blvd., Rochester 3, N. Y. *Phone*: Glenwood 7972

Gear Motors

The MV vertical gear motors are used for driving vertical shafts (particularly in mixing applications). They are also suited for wall mounted applications; when so mounted, the worm is located below the gear.



The double-reduction units have a helical primary and double-enveloping worm gear secondary. All teeth are straight-sided and tangent to a common circle. They are in contact the full depth of the teeth. One-eighth of the gear



TO "TENTHS" IN SECONDS

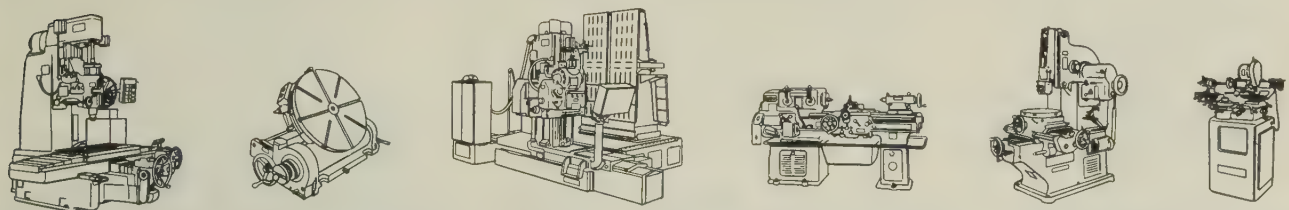
. . . *and no mistakes!*

WITH NEW PRATT & WHITNEY NUMERICAL CONTROL

Operating under Numerical Control, this P&W Precision Hole Grinder is positioned and re-positioned — accurate to .0001" — in an average of only 14 seconds! And since settings are controlled by a punched tape, the chance of work spoilage through operator error in reading blueprint data or setting dials is eliminated. The operator is free to concentrate his attention on work quality.

Applied to Pratt & Whitney Jig Borers, Precision Hole Grinders, Rotary Tables and special machines, Numerical Control not only speeds up toolroom operations, but also makes the high precision of these machines available for efficient short- or long-run production work. In this type work, time savings up to 40% over manual operation are realized. Compare the performance of your present manually-controlled machines with the new standards of speed, accuracy and economy being established by numerically-controlled P&W equipment. If they don't measure up, you are missing important opportunities for improved work quality, larger savings and greater profits.

Write now for complete information.
Pratt & Whitney Company, Incorporated,
13 Charter Oak Boulevard, West Hartford, Conn.



JIG BORERS . . . ROTARY TABLES . . . KELLER MACHINES . . . LATHES . . . VERTICAL SHAPERS . . . CUTTER AND RADIUS GRINDERS

PRATT & WHITNEY

FIRST CHOICE FOR ACCURACY

MACHINE TOOLS • GAGES • CUTTING TOOLS

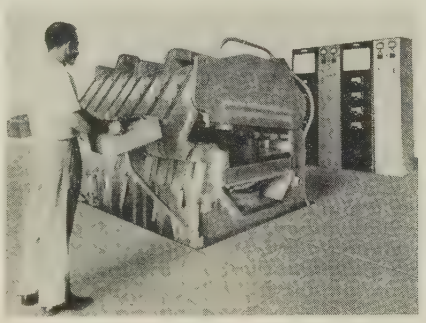
NEW PRODUCTS and equipment

teeth always mesh. The resulting high area of contact between worm and gear teeth spreads unit loads over a large area.

There are gear motor models to handle 1 to 15-hp standard NEMA D-flange motors. There are 27 standard output speeds, from 7.3 to 525 rpm. *Write*: Cone-Drive Gears Div., Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. *Phone*: Twinbrook 1-3111

Press Forms Titanium

This hot forming and sizing press is used for the automatic straightening and finish forming of titanium and stainless steel parts.



The press automatically removes cans, wrinkles, buckles, and other inaccuracies. *Write*: T. W. & C. B. Sheridan Co., 24701 Crenshaw Blvd., Torrance, Calif. *Phone*: Davenport 6-6702

Spooled Wire

Ampco-Trode 160 is used to join high strength, hard aluminum bronzes. It develops tensile strengths up to 100,000 psi and Brinell hardnesses of 190 to 220.

The spooled wire is used for joining and overlay with the inert gas, consumable electrode process. The wire conforms to AWS-ASTM classification E Cu Al-B. *Write*: Ampco Metal Inc., 1745 S. 38th St., Milwaukee 46, Wis. *Phone*: Mitchell 5-3750

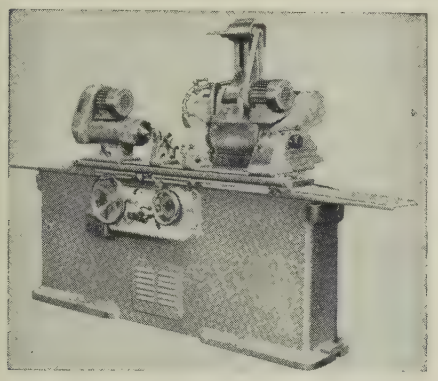
Cylindrical Grinder

Model R-7 comes in two capacities, 13 x 40 in. and 13 x 60 in., with or without plunge-cut feed and automatic sizing.

Spindle flutter is prevented by

oil-suspension lubrication of the spindle bearings, which eliminates metal to metal contact.

The wheel head swivels on a vertical centerline and operates without vibration even when using grinding wheels up to 16 in. in diameter.

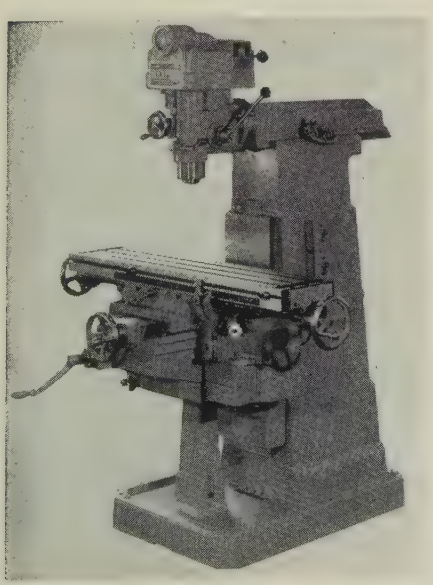


Feed adjustment from 0.0001 to 0.001 in. can be obtained. Large dials indicate the feeds in 0.0001 in. When zero is reached, the feed disengages automatically.

The workhead can be moved along the table and swivels on a graduated base for taper grinding or facing. *Write*: S & S Machinery Co., 140 53rd St., Brooklyn 32, N. Y. *Phone*: Hyacinth 2-7400

Milling Machine

The Rockford Mill is a vertical machine with an infinitely variable spindle speed drive. It also has a rigidly held rotating head, a vibration-free quill, and positive



automatic depth control.

No changing of gears or belts is needed in making spindle speed adjustments. Obtainable speeds range from 85 to 560 rpm in the low range and from 600 to 3720 rpm in the high range.

The head can be swiveled to any desired angle. A positive quill control lever provides a stepless quill feed range from 0 to 0.008 in. per revolution. *Write*: Fenlind Engineering Co., 5602 Pike Rd., Rockford, Ill. *Phone*: 7-5717

Transmission Belt

The Unicord belt has a tension member which consists of one ply of high strength synthetic cord.

The problem of stretching is eliminated in the belt by manufacturing it under controlled humidity conditions.

With ply separation eliminated, flex life of the belt is long. Pulleys as small as 4 in. are used.

Belt widths range from 4 to 6 in. Lengths are from 100 in. to 45 ft. *Write*: B. F. Goodrich Industrial Products Co., Akron, Ohio. *Phone*: Blackstone 3-1171

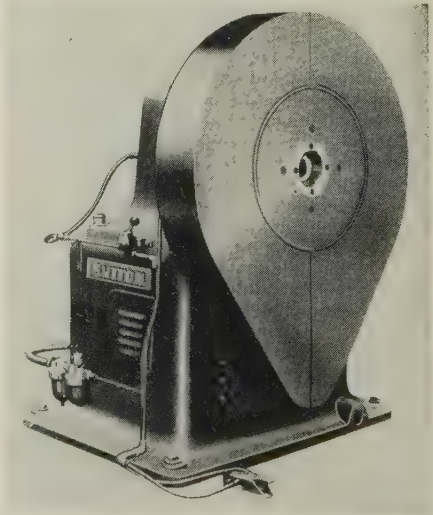
Computer

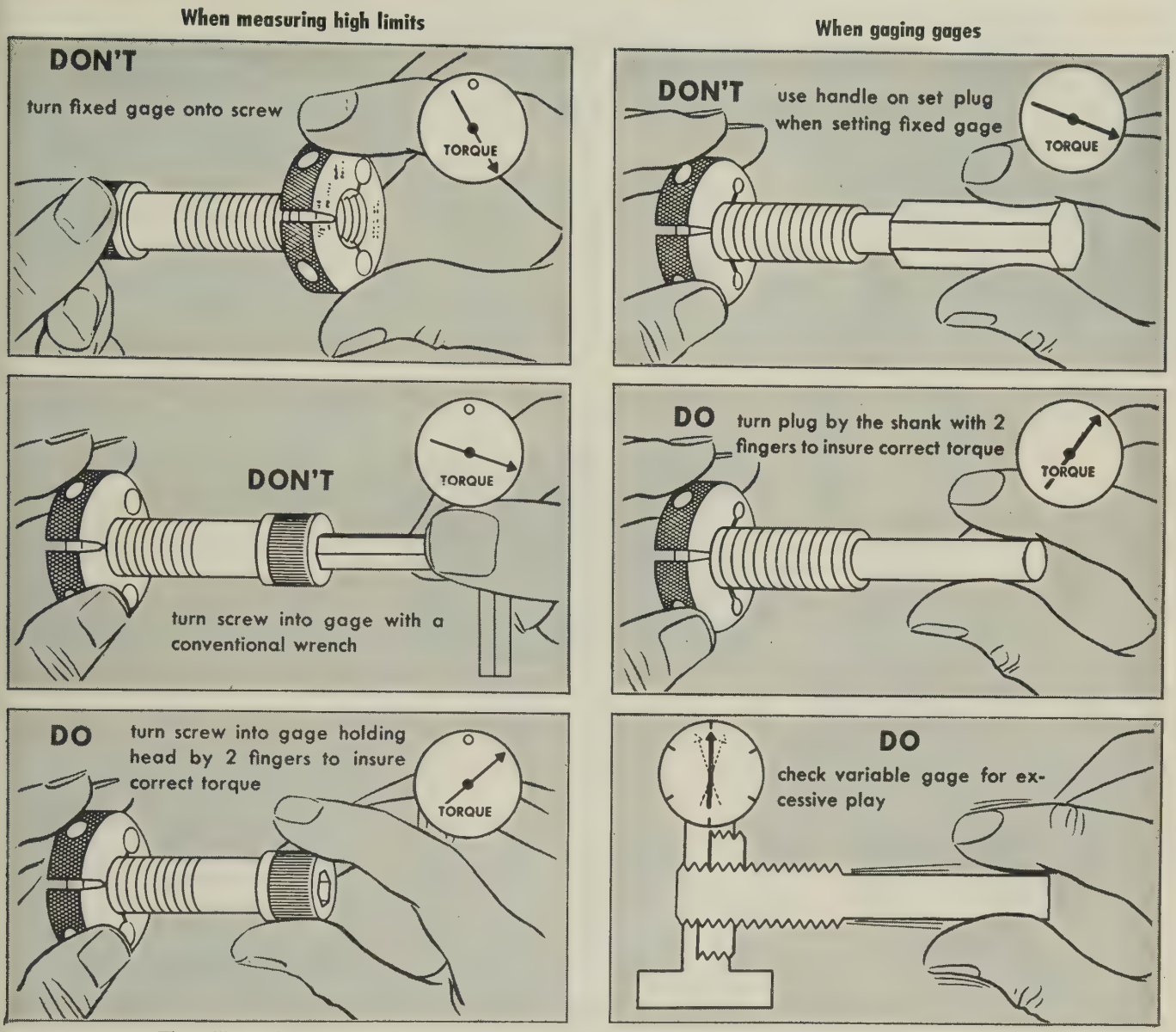
The 610 is an electronic computer which can handle a wide range of problems, such as bridge and highway design; stress, flutter, and vibration analyses encountered in jet aircraft design; sales forecasting; reduction of test data for guided missile performance studies; and cam design and performance analysis for industrial equipment manufacturers.

The computer can make 214 additions or subtractions, and 52 divisions or multiplications a minute. It has an automatic decimal point control. *Write*: International Business Machines Corp., 590 Madison Ave., New York 22, N. Y. *Phone*: Plaza 3-1900

Rotary Swagging

The Farmer Norton machines are used for reducing ends of bars and tubes, fixing terminals to wire cable, and many other swaging operations. A two die, rotary spindle design is used for small





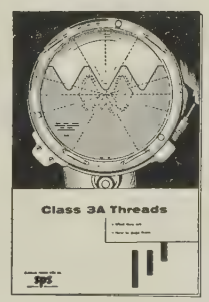
These illustrations from new SPS booklet show some of the do's and don'ts of gaging precision threads.

3A threads: what they are; how to gage them — new SPS booklet tells all

Threads made to Class 3A fit are the most precise in general use in industry. But you do not always get the 3A precision you specify. Because of many different gaging techniques that yield varying results, screws with threads well outside the Class 3A tolerance limits often pass inspection.

SPS has prepared a new booklet on this subject. It explains clearly what Class 3A threads are and the pros and cons involved in the widely varying gaging techniques in use today. It reviews the gaging of high and low limits of 3A threads, sampling techniques, and even the methods of gaging gages.

All standard UNBRAKO socket screw products fall within specified tolerance limits *no matter what method is used to gage them.* Leading industrial distributors carry complete stocks. Unbrako Socket Screw Division, STANDARD PRESSED STEEL Co., Jenkintown 33, Pa.



We also manufacture precision titanium fasteners. Write for free booklet.

Form 2239, "Class 3A Threads: what they are; how to gage them." 16 pages, with many illustrations. Write for free copy today.

STANDARD PRESSED STEEL CO.

UNBRAKO® SOCKET SCREW DIVISION SPS

JENKINTOWN PENNSYLVANIA

machines; a four die, inverted, stationary spindle type machine is used for larger work.

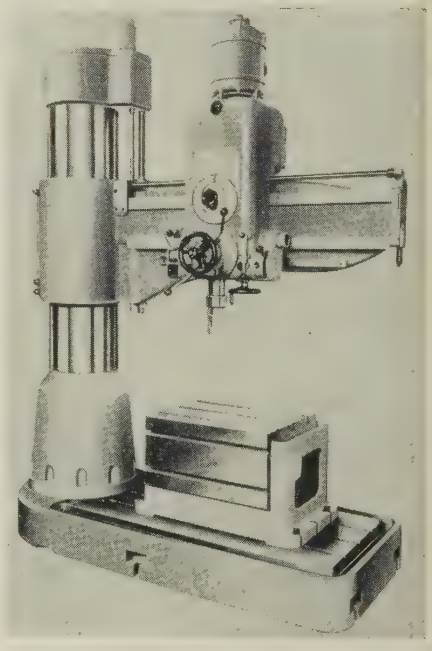
Only when the operator depresses the treadle do the striking rollers contact the hammer blocks. At all other times, the swagers run silently.

The striking rollers are accurately spaced in floating cages to ensure regularity of hammer blows. *Write*: Sutton Engineering Co., First National Bank Bldg., Pittsburgh 22, Pa. *Phone*: Grant 1-8077

Radial Drills

This 4 ft x 15 in. model is one of a family of Speedmasters that range from 3 ft x 11 in. up to 12 ft x 28 in.

Ways of the arm are hardened to 220 Brinell. Its alignment and balance are such that it swings with a light pressure.



The machine has 8 feeds and 12 speeds, from 43 to 2400 rpm. An electromagnetic brake can stop the spindle instantly, regardless of its revolution speed.

An ammeter is provided for constant readings of electrical load during varying drilling or tapping pressures.

Speeds can be selected without stopping the drill. S & S Machinery Co., 140 53rd St., Brooklyn 32, N. Y. *Phone*: Hyacinth 2-7400

NEW Literature

Write directly to the company for a copy

V-Belts

This 24-page bulletin gives cross-reference information on variable speed V-belts. Interchange listings include drive data and part number listings of the manufacturers. Industrial Div., Dayton Rubber Co., Dayton 1, Ohio.

Metal Balls

Bulletin 101, 8 pages, gives specifications and application and design data for chrome steel, stainless steel, brass, bronze, and Monel balls from 1/16 to 4½ in. in diameter. Accuracy, material analysis, and ball hardness are discussed. Hoover Ball & Bearing Co., Ann Arbor, Mich.

Rod Headers

A line of open die rod headers (used to upset heads on long rods which can't be handled on automatic rod headers) is described in this 8-page bulletin, 866-A-3. Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

Inert Gas System

Inert atmosphere generators and their uses in the metallurgical industries are covered in Bulletin I-457, 4 pages. Gas Atmospheres Inc., 20011 W. Lake Rd., Cleveland, Ohio.

Embossing Presses

Knuckle joint presses in capacities from 150 to 1000 tons for sizing, coining, embossing, and similar uses are depicted in this 8-page bulletin. Minster Machine Co., Minster, Ohio.

Electric Brakes

This 8-page bulletin, WEB 6292, covers electric brakes, clutches, and controls for miniature mechanisms or high torque machine drives. Warner Electric Brake & Clutch Co., Beloit, Wis.

Cold Treating

Refrigeration units and their uses in cold treating are covered in this 4-page bulletin. Alpha Electric Refrigeration Co., 1115 E. Seven Mile Rd., Detroit 3, Mich.

Flexible Shafts

Bulletin 250, 12 pages, describes flexible shafts for power transmission. Included are full scale drawings, maximum recommended speeds, maximum operating torque, straight and minimum radius, static breaking

Now, for the first time, you can accurately predict what the dimensional characteristics of iron powder will be after sintering operations. You can eliminate the element of uncertainty in powder reaction, before a part or tool is designed, before a production run is started.

This major development is the result of Republic's exclusive *Controlled Dimensional Factor* process of manufacturing iron powder.

CDF means that in the presence of copper, Republic Iron Powder—depending on type—can be made to grow, shrink, or remain stable within acceptable tolerance limits. The powders have been designated as:

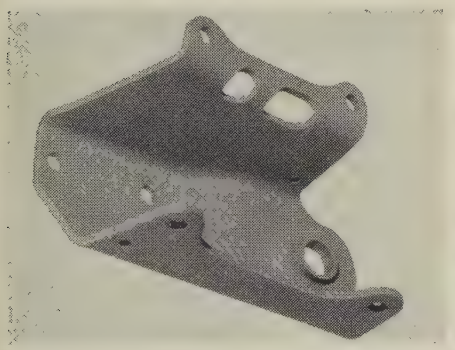
TYPE "G" FOR GROWTH—A powder having a definite growth characteristic in the presence of copper. It was developed for use in many *existing* dies designed for powder which expands when sintered.

TYPE "N" FOR NORMAL—This powder has been given normal variation in dimensional change from slight shrinkage to slight growth, depending upon the end result required.

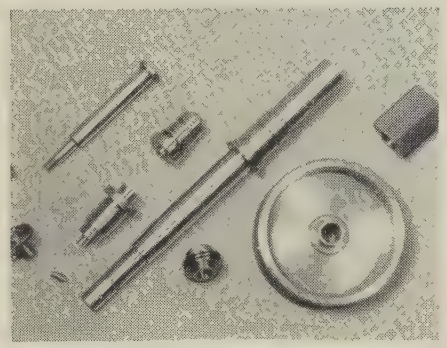
TYPE "S" FOR SHRINKAGE—A powder with an extremely high shrinkage characteristic which can be used to attain certain tensile strengths with lesser quantities of copper.

CDF provides definite benefits for everyone concerned with the design and fabrication of iron powder sinterings. Consistently uniform shrinkage and growth values aid the design engineer in establishing final dimensions of parts. Tool engineers can design tools to part print dimensions with the assurance that tolerances, transverse to the direction of pressing, can be held within ±.001 inches per inch. Fabricators can produce consistently uniform sinterings at faster rates and at minimum cost.

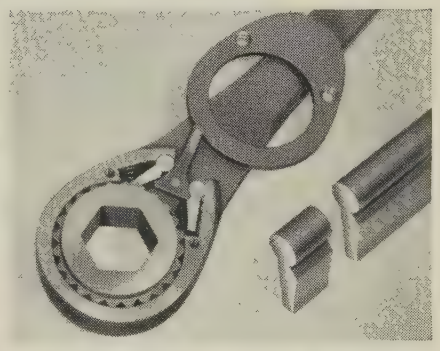
Republic Booklet Adv-763 contains complete information on test evaluations, chemical composition, and physical properties. Mail the coupon for your copy; or for obligation-free metallurgical service.



PRODUCTION FACILITIES, plus complete design and engineering service, go to work for you as an extension of your plant, when you have stamped and drawn parts fabricated by Republic's Pressed Steel Division. One example of a wide variety of steel parts mass-produced to specification, at the lowest possible cost, is the truck-shaft bracket shown above. Write for Booklet Adv. 681.



PRODUCTION OF PRECISION PARTS at higher speeds and feeds with fine finished surfaces and longer tool life, is made possible by the use of Republic Cold Finished Steels. Republic offers you a complete range of carbon, alloy, and stainless analyses drawn to precise size and cross section. Mail the coupon today for complete information on Republic Cold Finished Steels.



PRODUCTION OF BUILT-UP, INTERLOCKING OR ASSOCIATED PARTS is greatly simplified by the use of Republic Cold Drawn Special Sections. Machining time and costs are reduced to a minimum because the sections are preformed to the predominating cross section of the part. Cold drawing also improves physical properties in the parts. Available in all grades of carbon, alloy and stainless steel. Send coupon for more data.

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☐ Special Sections

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NEW LITERATURE . . .

torque, and a chart for determining the proper shaft from the speed and horsepower. B. W. Elliott Mfg. Co. Inc., 350 State St., Binghamton, N. Y.

Cleaning Machines

Catalog 105-D, 34 pages, presents more than 50 case histories showing how airless blast, air blast, and wet blast cleaning are used. Wheelabrator Corp., 1157 S. Byrkit St., Mishawaka, Ind.

Surface Grinders

This 6-page bulletin describes features, capacities, weights, and specifications of a line of precision grinders. Abrasive Machine Tool Co., Dexter Road, East Providence, R. I.

Microprojector

This 6-page folder describes a projector that provides 10 to 100-power magnification. George Scherr Co., 200 Lafayette St., New York 12, N. Y.

Investment Casting

Composition and physical properties of ferrous and nonferrous alloys used in investment castings are listed in this chart. Included are design specifications. Alloy Precision Castings Co., 3855 W. 150th St., Cleveland 14, Ohio.

Turret Lathes

Hydraulic drives for ram type turret lathes are described in this 4-page bulletin. Jones & Lamson Machine Co., Springfield, Vt.

Steel Strapping

This 4-page bulletin describes a steel strapping that consists of a continuous series of angular connected links. Acro Metal Stamping Co., 332 E. Reservoir Ave., Milwaukee 12, Wis.

Thermocouple Gland

A small gland that provides a positive seal for pressures from 0.005 microns to 5000 psi at temperatures from −300 to +1850° F is described in Bulletin MTG. Conax Corp., 2300 Walden Ave., Buffalo 25, N. Y.

Roll Design

Bulletin 13, 2 pages, discusses how correct design can eliminate vibrations in rotating rolls by avoiding their critical speed. Rodney Hunt Machine Co., Orange, Mass.

Dust Collector

Units for collecting fog and mist created by wet grinding and machining operations are covered in

LUBRICATION NEWS

12 big reasons why cost conscious industry is using Norgren MICRO-FOG® LUBRICATION

1. Better Lubrication — Less Machine Down Time

MICRO-FOG automatically coats all bearings, gears, chains and other machine components with a continuous, protective film of clean oil. Reduces wear on machine components and cuts maintenance and replacement costs.

2. Oil Always Fresh, Always Clean

No recirculation of deteriorated or contaminated lubricant to cause wear or corrosion. Clean oil is applied continuously in carefully metered amounts.

3. For All Sizes and Types of Bearings

MICRO-FOG has found enthusiastic acceptance for all types of machinery, from *high speed* grinders to huge roll mill bearings on 34" diameter shafts, turning at *low speeds.*

Automatic Air-Borne Lubrication

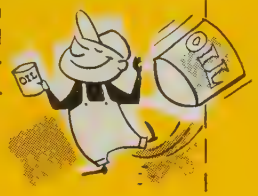
for
- BEARINGS
- GEARS
- CHAINS
- SLIDES
- WAYS
- OTHER MACHINE COMPONENTS

4. Centralized, Automatic Lubrication

A single MICRO-FOG Lubricator will automatically deliver enough air-borne lubricant, proportionately distributed, to completely lubricate a large machine. Only one lubricator to maintain and refill.

5. Big Savings in Lubricant

Carefully metered quantities of oil are applied to each lubrication point, providing more thorough lubrication with a few ounces of oil per day than other methods using several gallons.

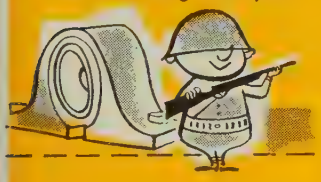


6. Bearings Run Cooler

Air passing through the bearing carries away heat. There is no pool of lubricant in the bearing to generate heat as a result of fluid friction. Lubrication is continuous—no periods of insufficient lubrication.

7. Contaminants Excluded From Bearings

A slight pressure is maintained within the bearing with air continuously escaping and preventing entrance of contaminants from surrounding atmosphere.



8. Fewer Bearing Seals Required

Because MICRO-FOG must be vented to the atmosphere, it is not necessary to maintain tight seals. Fewer oil seals are required, reducing maintenance and machine down-time.

9. Oil Filters, Sumps and Pumps Eliminated

The quantity of lubricant used is so small that there is nothing to reclaim or recirculate. Expensive high pressure piping is also eliminated.

10. Automatic Alarm Controls

MICRO-FOG Lubricators are available with switches to actuate an alarm system or controls as a warning of conditions affecting proper lubrication.

11. Visible Oil Feed

The oil feed is readily visible on all MICRO-FOG Lubricators, providing positive proof that the lubricator is operating properly.

12. A MICRO-FOG Lubricator for Every Size Machine

19 models to choose from—ratings up to 1,000 bearing inches and oil reservoir capacities up to four and one-half gallons.

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NEW LITERATURE . . .

this 12-page bulletin, 815. Hammond Machinery Builders Inc., 1611 Douglas Ave., Kalamazoo, Mich.

Chemical Compounds

Processing compounds for the metalworking industry are covered in this 16-page bulletin. It describes 57 chemical processes. Turco Products Inc., 6135 S. Central Ave., Los Angeles 1, Calif.

Induction Heating

High frequency, motor-generator, induction heating equipment for brazing, annealing, deep hardening, forging, and melting are covered in Bulletin 12B8513, 4 pages. Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Power Cranes

Use of power cranes in industrial plants is illustrated in Bulletin 5, 24 pages. Power Crane & Shovel Association, 75 West St., New York 6, N. Y.

Turret Lathes

A preventive maintenance chart covers the cleanliness, lubrication, and inspection and adjustment of ram and saddle type turret lathes. Both desk and wall size charts are available. Gisholt Machine Co., Madison, Wis.

Resistance Wire

A 60-16 nickel-chromium-iron resistance alloy and its design factors are covered in this 16-page bulletin. Specifications are given for a complete range of wire diameters and ribbon widths and thicknesses. Hoskins Mfg. Co., 4445 Lawton Ave., Detroit 8, Mich.

Stainless Steel Specs

This chart shows the chemical requirements for the most used military and other federal specifications. Also listed are bars, wire, and other forms and the nearest corresponding SAE, AISI, and AMS numbers. Peter A. Frasse & Co. Inc., 17 Grand St., New York 13, N. Y.

Cylindrical Grinders

Catalog J-57, 24 pages, describes 14 and 18 in. universal grinders. Specifications are tabulated and design features illustrated. Landis Tool Co., Waynesboro, Pa.

Tool Steels for Diecasting

This 16-page bulletin presents technical data on the application and heat treatment of tool steels used in diecasting. Tool Steel Sales Div., Crucible Steel Co. of America, P. O. Box 88, Pittsburgh 30, Pa.

Industrial Radiography

This 16-page bulletin covers films, chemicals, and accessories for industrial radiography. A chart indicates the film to use for various material thicknesses. X-Ray Sales Div., Eastman Kodak Co., Rochester 4, N. Y.

Blind Bolts

This 8-page bulletin covers bolts for high strength, blind fastener applications. Hi-Shear Rivet Tool Co., 2600 W. 247th St., Torrance, Calif.

Stainless Steel

This 32-page catalog presents the description, chemical composition, strength factors, physical properties, and typical applications of a wide range of stainless steels, including the 200, 300, and 400 series. Advertising Dept., Sharon Steel Corp., Sharon, Pa.

Powered Screw Drivers

Bulletin 580-1, 36 pages, tabulates and illustrates more than 30 basic air motor units and torque limiting components for multispindle screw drivers and nut setters. Fully di-

NEW LITERATURE . . .

mensioned outline drawings are included. Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N. Y.

Blast Cleaning

Hand-operated hose machines are described in Bulletin 100C, 28 pages. It tells how to apply abrasives and lists the uses of wet and soft abrasives. A table shows how to match nozzle size with the required abrasive size. Pangborn Corp., Hagerstown, Md.

Roller Conveyors

This 4-page bulletin describes gravity roller conveying systems—including straight roller sections, curves, switches, Y-sections, ball tables, hinged sections, roller spirals, chutes, and slides. Alvey-Ferguson Co., 2086 Disney St., Cincinnati 9, Ohio.

Self-Locking Threads

This 4-page bulletin describes the locking, sealing, and adjusting features of a protruding nylon pellet which is permanently inserted in threads. Nylok-Detroit Corp., 1100 N. Woodward Ave., Birmingham, Mich.

Rust Remover

Properties and uses of a powdered acid scale and rust remover are covered in a 2-page service report. Oakite Products Inc., 134E Rector St., New York 6, N. Y.

Stresses in Bars

Residual stresses in cold-finished steel bars and their effect on manufactured parts are discussed in a 32-page booklet. LaSalle Steel Co., Hammond, Ind.

Grinding Wheel Dressing

This folder describes a perpetual form control for grinding wheel dressing. Examples of narrow dimensional limit groove grinding on an automated basis are included. Jones & Lamson Machine Co., Springfield, Vt.

Muffle Furnaces

Gas-fired furnaces for bright heat treatment and brazing of special steels and nonferrous metals are covered in Bulletin SC-179, 4 pages. Surface Combustion Corp., 2375 Dorr St., Toledo 1, Ohio.

Multiple Nut Setting

This 24-page bulletin describes the regulator mountings, air supply, suspension, maintenance, and related installation aspects of portable and machine-type multiple spindle tools. Discussed are the problems of various industries and the planning of bolt-spacing patterns. Automation Div., Thor Power Tool Co., Prudential Plaza, Chicago 1, Ill.

Polishing Compounds

Liquid and bar buffing compounds and their use are discussed in this 18-page bulletin. Frederic B. Stevens Inc., 1800 18th St., Detroit 16, Mich.

Grinding Wheel Speeds

This speed selector determines the revolutions per minute of a wheel and will also find the correct wheel diameter in inches or surface speeds in feet per minute. A reference table, on the back, shows recommended speeds for each of the standard types and shapes of grinding wheels. Sales Promotion Dept., Simonds Worden White Co., 1101 Negley Place, Dayton 7, Ohio.

Metal Sheet Handling

Automatic equipment for feeding and delivery piling of ferrous and nonferrous sheets up to 120 x 180 in. is described in a 4-page bulletin. Technical information includes operating speeds, thicknesses of sheets or plates handled, and load capacities. The bulletin also explains operation of the

NEW LITERATURE . . .

machines. Dexter Folder Co., 219 E. 44th St., New York, N. Y.

Conveyors

Catalog 36, 40 pages, has 140 installation photos showing gravity and power conveyors and their application to flow operation and automation. It shows where and how to use the principal types of conveyors. Logan Co., Louisville 6, Ky.

Fire Hoses

This 8-page safety code covers the inspection, maintenance, and protection of standpipe and inside hose systems. Fire Equipment Manufacturers' Association Inc., 1 Gateway Center, Pittsburgh 22, Pa.

Battery Chargers

Metallic rectifier battery chargers for motorized hand trucks are described in Bulletin GEA-6525A, 4 pages. One chart lists charger weights and dimensions, another assists in selecting the correct model. General Electric Co., Schenectady 5, N. Y.

Titanium

Bulletin ADV-903 describes mechanical properties and uses of titanium and covers its production and processing. Advertising Div., Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.

NEW BOOKS

1957-58 Directory of Steel Foundries in the United States, Canada, and Mexico, Steel Founders' Society of America, 606 Terminal Tower Bldg., Cleveland 13, Ohio. 277 pages, $15.
Personnel, capacity, equipment, processes employed, use of product, and number of employees are listed in this book.

U. S. Research Reactors, Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. 73 pages, $1.50.
More than 30 research reactors, in operation or under construction, are described in this report prepared by Battelle Memorial Institute for the Atomic Energy Commission. Cost information is given for most of the reactors. Chapters cover light water moderated reactors (pool and tank types), heavy water moderated reactors, graphite moderated reactors, homogeneous reactors, and reactors for safety research.

STEEL

October 14, 1957

Market Outlook

ECONOMIC FORCES are giving steel companies plenty to think about—both for now and the future.

They are plagued with a drop-off in demand —at a time when steel capacity is being expanded substantially. Looking ahead, they can see threats of increased foreign competition and shifts in wants for steel.

MINDS AT WORK—The steel company economists and market researchers are trying to figure how far the current business contraction will go and what their companies will have to face five or six years hence. Some analysts have revised their predictions for the fourth quarter downward. They've had to reckon with economic forces, such as demand and supply, production costs, inventories, and prices. And the shape these conditions take today also influences the outlook for tomorrow.

A CHANGE?—For the tomorrow, they see a possibility of a reduced demand for plates for railroad freight cars and an increase in demand for light structurals for electric transmission towers. Rising freight rates are making it costly to haul coal via railroad to electric powerplants. The Cleveland Electric Illuminating Co. figures it will be cheaper to build a powerplant near the coal mines than to haul the coal to generating plants near the distribution area. The CEI has announced a new generating station near the mines, about 100 miles from Cleveland. Towers to support the high voltage transmission line will require light structural steel shapes. How many other power companies will make such a move? Steel company marketmen are watching it.

INVASION?—Another development in transportation is keeping them on their toes. Completion of the St. Lawrence Seaway may spread foreign steel competition further into the U. S. They see Toledo, Ohio, as a possible site for a warehouse center for European products, with distribution radiating to Detroit, Chicago, St. Louis, and other midwest centers.

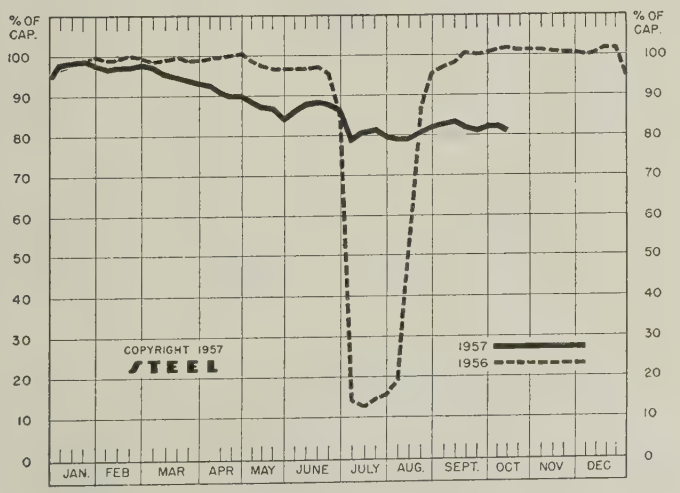
ONE TO WATCH—Japan, too, looms as a growing competitor for steel business. She's rapidly building up her steel industry. Most of the equipment is of the latest design. The nation has to export to live.

Aware of these possibilities of competition, and competition with other materials, the domestic steel companies are pursuing many courses to cut production costs, improve quality, and speed service.

CONTRASTS—For the moment at least, steel companies can give fast service. With capacity up and demand down, the steel industry is delivering some of its output within the month in which it was ordered. Yet this is a period of contrasts. Kaiser Steel Corp., Fontana, Calif., is producing ingots on a three-shift basis, and still it's short. The Lackawanna, N. Y., plant of Bethlehem Steel Co. is running above 100 per cent of capacity, and so is the Detroit district. But the Youngstown district is down to 70 per cent.

LOWER OUTPUT—The tendency over the country is for a slowing in the production pace. It is reflected in the rate for the week ended Oct. 13. At 81 per cent of capacity, it was 1 point below the preceding week's level.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

	Week Ended Oct. 13	Change	Same Week 1956	Same Week 1955
Pittsburgh	80	— 4.5*	100	101.5
Chicago	85.5	+ 0.5*	101.5	97.5
Mid-Atlantic	84.5	— 1.5	100.5	94.5
Youngstown	70	— 5	101	98
Wheeling	82	—14.5	104	98
Cleveland	90.5	+ 3.5*	103.5	103.5
Buffalo	100	0	107.5	105
Birmingham	70.5	— 1.5	95.5	97.5
New England	54	+ 4	80	90
Cincinnati	79.5	+ 1.5*	95	91.5
St. Louis	82.5	—12*	106	97.5
Detroit	101.5	+ 3*	101	94
Western	94	— 1	103	99
National Rate	81	— 1	102	97.5

INGOT PRODUCTION‡

	Week Ended Oct. 13	Week Ago	Month Ago	Year Ago
INDEX (1947-1949=100)	130.0†	131.7	130.5	154.6
NET TONS (In thousands)	2,088†	2,115	2,097	2,483

*Change from preceding week's revised rate. †Estimated. ‡Amer. Iron & Steel Institute. Weekly capacity (net tons): 2,559,490 in 1957; 2,461,893 in 1956; 2,413,278 in 1955.

Metalworking Outlook—Page 59

Technical Outlook—Page 115

ACCO for Better Values

SPEEDY SLING SERVICE with ENGINEERED SAFETY!

ACCOLOY® KUPLEX SLING CHAINS

Quick Service from Distributor's Stock!

• Your nearby ACCO Authorized Sling Chain Distributor now offers a new sling service that saves time and money for you. This is made possible by American Chain's sensational, newly-designed **ACCOLOY KUPLEX Sling Chains.**

SAFE, STRONG, STREAMLINED

These slings are the *latest and greatest development* in sling chains. All parts in each leg are manufactured *exclusively* by American Chain, of the same alloy, and engineered to be as strong as the chain itself. They are of a streamlined design that reduces the possibility of catching or snagging.

Finally the component parts are factory proof-tested to twice the working load limits—your assurance of maximum strength and safety.

Another valuable feature: all parts remain visible for easy, periodic wear inspection.

TWO STYLES—SIX SIZES

The new ACCOLOY KUPLEX Sling Chains are available in single-leg and two-leg styles and in six chain sizes, from ¼" through ⅞". All chain is made of Accoloy 125 material. All component parts of each assembly are marked and easily identified as to the size of chain with which they are to be used. Components are *color-marked in* **orange** for easy identification.

CERTIFICATE OF TEST, issued by ACCO and signed by your Authorized Distributor, is furnished with each sling shipment.

GET THE COMPLETE STORY

You will find it to your advantage to learn the full story of ACCOLOY KUPLEX Sling Chains—how easy they are to assemble and disassemble . . . how promptly and easily they can be serviced...and how you can benefit from this Great New Distributor Service and this Great New Sling Chain. Write for **Folder DH-54** and name of nearest ACCO Authorized Sling Chain Distributor.

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Conrad Hilton Hotel
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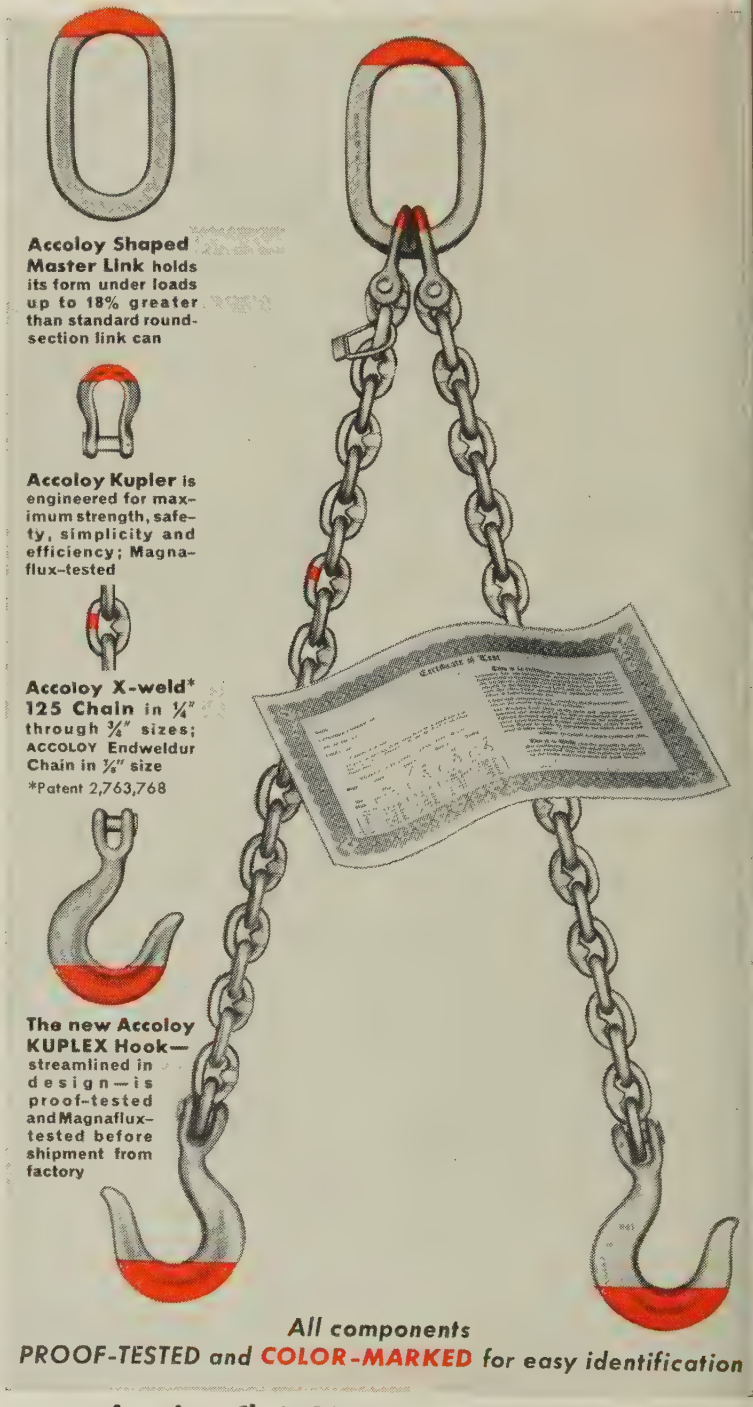

Accoloy Shaped Master Link holds its form under loads up to 18% greater than standard round-section link can

Accoloy Kuplex is engineered for maximum strength, safety, simplicity and efficiency; Magnaflux-tested

Accoloy X-weld* 125 Chain in ¼" through ¾" sizes; ACCOLOY Endweldur Chain in ⅛" size
*Patent 2,763,768

The new Accoloy KUPLEX Hook—streamlined in design—is proof-tested and Magnaflux-tested before shipment from factory

All components
PROOF-TESTED and **COLOR-MARKED** *for easy identification*

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Bridgeport, Conn. • Factories: *York and *Braddock, Pa.

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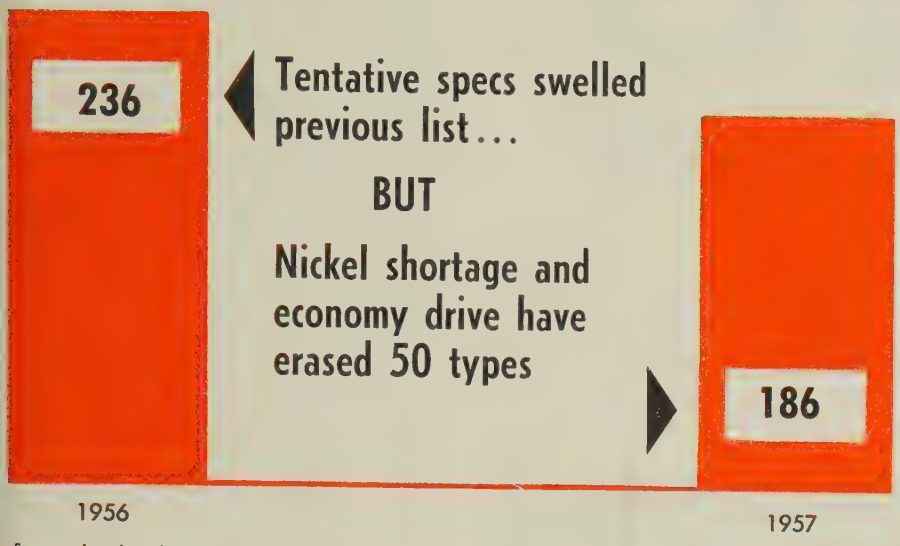
*Indicates Warehouse Stocks

ACCO TRADE MARK

List of Standard Alloys, H-Steels Shrinks



Source: American Iron & Steel Institute.

AISI Weeds Out Alloys

Recognition as standard grade is withdrawn from 56 steels no longer used in sufficient quantity. Six new grades are added, bringing total to 186

WHEN nickel was hardest to get, its producers predicted they would lose a good portion of their civilian markets. The latest listing of standard alloys and H-steels (to be published in STEEL's Metal Selector, Oct. 28 issue) indicates that they knew what they were talking about.

Net Decrease—The new list contains 50 fewer standard compositions than the previous one complied in 1955. Fifty-six designations were dropped; only six were added. A high percentage of the extinct types were high-nickel alloys, some of which were carryovers from military specifications during the Korean War.

The American Iron & Steel Institute, working with the Society of Automotive Engineers, regularly reviews its listings to determine whether an alloy is being produced in sufficient quantity and used in enough applications to warrant the designation of a standard number. Tonnage requirements vary from alloy to alloy, but it is usually a specified percentage of the total alloy tonnage produced in a given period. For example, 8653 was a one-job steel. Since no other application was reported within a reasonable time after completion of the original job, the type was dropped.

Victims of Shortage—At one time fabricators insisted there was no substitute for nickel. The government's stockpile program and the ensuing nickel shortage forced them to use alternate materials. Now they find that the substitutes are just as good in most cases and cheaper. Some of the 2300, 2500, and 3100 series were dropped this year because consumers found that 4063 and 4047 could do the job. A new type—4012, containing no nickel—took the place of 4608 (1.40 1.75 per cent nickel) for making bearings. Another victim, 4812 (3.25-3.75 per cent nickel) gave way to 8822, containing only 0.40-0.70 per cent nickel.

Victims of Cost—Rising costs have contributed to the trend. Although the 8600 alloys, with their lower molybdenum content, do not completely replace the higher moly 8700 steels, fabricators have turned to them because they are cheaper.

Other standard alloys and H-steels (the H identifies steels specified to hardenability band limits) were deleted because experience proved that their compositions varied from other standard grades to an insignificant degree.

For the first time, the institute is listing a nitriding steel as a standard alloy. Formerly known as Nitralloy G Modified, the Nitralloy patent has run out, and the institute is considering assigning it a number.

More Shrinkage?—With nickel becoming more abundant (see Page 204), it is possible that consumers will return to the old types in sufficient quantity to reinstate them as standard. But one metallurgist has remarked that experience over the last few years has shown that a good carbon steel used properly can do many things once considered to be nickel alloy exclusives. A second factor to consider is the habits of the consumer. It took several years of nickel shortage to get him out of the habit of automatically ordering nickel alloys. Now that he has made the switch, it could take just as long to change his ways.

Stainless Steel . . .

Stainless Steel Prices, Page 194

Stainless steel sales are somewhat heavier in the East for fourth quarter. Warehouse stocks are less bulky. Some replacement buying is reported with deliveries improved (60 days or better), including plate tonnage. Demand for the 430 grade by automotive suppliers is up moderately for October-November. Mills have larger stocks for prompt shipment, both in flat-rolled and bars.

Wire . . .

Wire Prices, Pages 192 & 193

Wire mill bookings are slightly heavier this month, but volume is developing slowly for November. Consumers are paying slight heed to leadtimes, confident they can obtain relatively prompt shipments

in most items. With rod inventories substantial, the wire mills are intensely competitive and are meeting the pressure for prompt shipments.

Heading wire demand is spotty. Screw volume is slightly heavier. High carbon wire buying for spring coils is erratic. Some coilers are buying; others are not.

Some improvement in automotive wire requirements is noted.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 191 & 192

Cold-rolled sheets are setting the market pace in the Midwest. Some district mills will operate at 100 per cent this month, and their bookings for November are at about the same rate as they were for October.

Consumers are not rushing to buy. Nor are they displaying a disposition to build inventories. Automotive stocks are only 15 to 20 days on the average. Users realize that cold-rolled capacity is adequate to enable the mills to give prompt deliveries. Even producers that are fully booked can give shipment in about five weeks.

Automotive orders are not up to expectations. This accounts for the lack of pressure in the market. Hot-rolled sheets are following the cold-rolled pattern, being easy to get. Galvanized sheet capacity is not fully engaged.

Carbon sheet capacity for October is not booked full in the East, and orders for November lag in the district. Demand for sheet specialties has perked up more in the area than that for carbon grades, but the improvement is not impressive, and is marked by aggressive selling. Razor blade steel demand is holding at a high level in New England, where the slight improvement in sheet buying is held largely to specialties, including coated grades for painting.

While demand varies somewhat from district to district, producers are revising their estimates of fourth quarter requirements. Not only have automotive needs fallen behind expectations, but ordering by the appliance makers has shown little change from September levels, and general market needs are only so-so. Volume sheet buying is not anticipated until automakers have a better idea as to how their 1958

models will be received by the public.

St. Louis area sheet sellers note a mild pickup in ordering. They say October schedules are full on cold rolled, and their bookings for November and December are improving. At Buffalo, the competitive race for business is getting hotter, and some market observers predict it won't be long before there may be some price shaving.

The Granite City Steel Co., Granite City, Ill., now can produce wider hot-rolled sheets and plates with the installation of an automatic coiler at its continuous mill. This can handle steel strips up to 72 in. wide and ⅜ in. thick. The company's previous width on hot sheets and plates was 61 in.

Semifinished Steel . . .

Reinforcing Bar Prices, Page 190

Republic Steel Corp. tapped the first heat from its new 400-ton open hearth furnace at its Cleveland Works on Oct. 4. The mill now has 20 open hearths. Another 400 tonner will be brought into production at the works around mid-November.

About 600 employees at Kaiser Steel Corp.'s Fontana Works were temporarily furloughed recently because of a shortage of ingot steel for the rolling mills.

Reinforcing Bars . . .

Semifinished Prices, Page 190

A seasonal decline in demand for reinforcing steel is reported at most market centers. Rolling mills still hold substantial order backlogs, but bookings are not keeping pace with order completions.

Government and state highway construction continues at an active pace. Public work will provide strong market support over coming months, though the rush of demand for bars and other reinforcing steel is about over for this season.

Bids will be taken Oct. 15 for 6300 tons of reinforcing bars for the Washington State Hood Canal floating bridge. Other pending tonnage in the Pacific Northwest includes lots for the Seattle Public Library and a Washington State library at Olympia, Wash.

A new guard rail for such uses as highways, bridges, and parking

lots, has been put on the market by the Granco Steel Products Co., St. Louis. It consists of a beam that runs parallel to the ground at bumper level.

High cost of construction is causing concern among makers of reinforcing and structural steel. Because money appropriated for highway construction isn't going as far as expected, some programs may be slowed. The cost of superhighways in the Chicago area, for instance, is running a third higher than estimates made two years ago. Bridge costs are reported up as much as 44 per cent.

Steel Bars . . .

Bar Prices, Page 190

Sluggish demand continues in the merchant bar market. There is little forward buying of either carbon or alloy grades.

Prompt shipments are available, and consumers are inclined to hold back advance orders. Not only can the mills give prompt shipments because of their large stocks of semifinished, but, in the case of cold-drawn material, delivery can be made from stocks of the more common sizes.

Order backlogs are small, and demand is particularly disappointing from the automotive industry. Alloy bar requirements are a trifle better in New England but not enough to extend mill shipping schedules. Forge shops are not increasing their specifications. Cutbacks and stretchouts in defense needs will show up more, early next year.

A Pittsburgh area producer comments: "We'll have to see a pronounced pickup in farm equipment and automobiles before hot-rolled bar sales improve."

Tin Plate . . .

Tin Plate Prices, Page 192

Although order books are fairly well filled, tin mills will not run at full capacity this year. Several factors are at work. Example: Drought in some areas, particularly the northeast, has served to hold down demand for the food pack.

Plates . . .

Plate Prices, Page 190

Lukens Steel Co., Coatesville, Pa., last week reduced its price on carbon plates $8 a ton. The new price, $102 a ton, is in line with that of other major producers.

Elimination of the premium largely reflects lower scrap costs. Lukens is a large scrap consumer.

The company is operating at capacity on demand for heavy plates and specialty steel plates. Its action caused some eyebrow lifting, but other platemakers quickly announced they were holding their prices. But there is little question that they are under less demand pressure than they were. Some fabricators reportedly are not taking their full quotas.

Indications are that though new buying has eased, heavy sheared plates will be in tight supply through the fourth quarter. November schedules are full, in most cases. Some December tonnage is in hand. Universal and strip mill sizes are in ample supply, as are heads and flanged products. All tonnage being offered is not being quickly taken up by users. Con-

sumers are not building heavy inventories, with supplies noticeably easier, including availability of larger tonnage from warehouses.

Generally, plate shortages have disappeared, at least to the extent dealers in premium-priced tonnage are offering shipments at prices close to the standard mill level.

Despite indications of a loosening market, mill shipments of plates 1 in. thick and over are closely allocated. Railroad requirements are less pressing than they were. So is demand from the oil industry and makers of earthmoving machinery, both of which are reportedly cutting back orders. Shipyard and powerplant requirements are heavier.

Tubular Goods . . .

Tubular Goods Prices, Page 194

Weakness prevails in several tubular products. Buttweld pipe continues in the doldrums, and seamless standard pipe sales are slowing down. Demand for mechanical tubing is sluggish, except for a little ordering by some warehouses.

The mills look for gradual demand improvement late in the fourth quarter, as distributors complete inventory reduction.

Orders for oil country tubular goods are being received in good volume, though demand is below that of previous quarters. Suppliers expect users to hold stocks at a minimum until yearend. An increase in ordering is expected in first quarter next year.

The city of Seattle opened bids for 1686 tons of 16 and 4 in. cast iron pipe recently. No other large inquiries are out at the moment in the Pacific Northwest, but sellers expect a pickup toward the end of the year.

Warehouse . . .

Warehouse Prices, Page 195

Warehouse steel business is spotty. Some distributors report a slight increase in bookings, others a decline. The trend varies by product.

A Pittsburgh warehouse specializing in flat-rolled products says September sales were 10 per cent above August's and expects October volume to show a similar gain. Demand for cold-finished and hot-rolled sheets is below peak levels.

With plate and structural shape stocks improving, distributors can supply a wider variety of those items. Demand continues dull for bars and tubular products. Buying interest in tin plate lags.

The undertone of the galvanized sheet market is soft in the East. A substantial part of business booked is at or near the mill price level. Because of the low profit margin, some distributors are not pushing sales of this product.

Alloy and specialty business booked in the first nine months was 15 to 20 per cent below that in the same period last year. Stainless sales were not down that much. Because prices are higher than they were a year ago, dollar sales compare more favorably.

Pig Iron . . .

Pig Iron Prices, Page 195

Shipments of pig iron to gray and malleable iron foundries are light, possibly a little smaller than they were last month. Many melt-

Birthplace of a new kind of hydraulic safety

Fire is a fighting word for the Navy's flattop fleet. In mere minutes it can engulf the biggest carrier. And once it hits the catapults or the deck-edge elevators that lift planes topside for launching, the carrier's striking force is nil.

Four years ago, Houghton solved the Navy's problem of fire-resistant hydraulic fluids for catapults with Houghto-Safe 620. This water-glycol fluid has been serving the Navy ever since—and has earned first place in industry as well.

But the Navy still had a problem with hydraulic deck-side elevators. It needed a hydraulic fluid that could withstand extremely high bearing pressures . . . a fluid with oil-like efficiency, yet fire-resistant.

Again, Houghton answered the S.O.S. with Houghto-Safe 1120, a phosphate ester fluid in a class by itself. It has high lubricity . . . fire and corrosion resistance . . . high flash and fire point . . . stability in storage or use. It met and exceeded Navy specifications, so now Houghton supplies *both* types for carrier safety.

Let Houghton solve your industrial hydraulic fire-resistance problems, too. Just call your Houghton man or write to E. F. Houghton & Co., 303 W. Lehigh Ave., Phila. 33, Pa.

HOUGHTO-SAFE

. . . a product of

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PHILADELPHIA • CHICAGO • DETROIT • SAN FRANCISCO

Ready to give you on-the-job service . . .

ers are operating considerably less than 40 hours a week because of the small order backlogs. They are buying cautiously, generally hand to mouth.

In New England, machine tool business is slower, resulting in short operating schedules at foundries supplying castings to that industry. Valve requirements are holding at a level somewhat higher than the general average. Steel foundries have a two to three month order backlog.

One factor sustaining the iron market is the increased use of iron by steel mills. One mill in the Buffalo district, for instance, is consuming virtually all of its iron output, leaving little for the merchant trade.

Republic Steel Corp. has taken off its No. 5 blast furnace at Youngstown because of a decline in orders. It is an 850-ton unit.

Iron Ore . . .

Iron Ore Prices, Page 196

Stocks of iron ore and ore agglomerates on hand at the end of August totaled 58,511,981 gross tons, reports the American Iron Ore Association. This compares with 47,760,467 tons held on Aug. 31, 1956.

The breakdown by origin: U. S. Lake Superior, 42,275,767 tons, against 33,676,795 a year ago; other U. S., 3,489,869, against 2,782,453; Canadian Lake Superior, 1,675,677, against 1,797,928; other Canadian, 4,801,112, against 4,128,857; foreign (Canada excepted), 6,269,556, against 5,374,534.

Consumption amounted to 11,422,725 tons in August, compared with 10,971,450 tons in August last year. Total consumption in the first eight months this year was 91,097,288 tons, against 78,383,500 in the like period of 1956.

The ore consumption breakdown for August: U. S. Lake Superior, 6,725,262 tons, against 6,402,287 a year ago; other U. S., 1,916,518, against 1,812,729; Canadian Lake Superior, 313,278, against 456,100; other Canadian, 871,924, against 1,014,321; foreign (except Canada), 1,595,743, against 1,286,013.

The consumption breakdown for the first 10 months: U. S. Lake Superior, 55,590,356 tons, against 50,550,164 in 1956; other U. S., 13,486,410, against 11,806,595; Canadian Lake Superior, 2,662,035, against 2,241,970; other Canadian, 6,441,450, against 4,317,641; foreign (except Canada), 12,917,037, against 9,467,130.

At the end of August, 244 blast furnaces were operating in the U. S. and Canada out of a total of 273. This compares with 254 engaged on Aug. 31 a year ago.

The Great Lakes ore fleet of the Pittsburgh Steamship Div., U. S. Steel Corp., will operate through November, weather permitting. This season, the fleet had transported 17,480,000 tons of iron ore from Lake Superior ports to lower lake docks by the end of September. This exceeds the 17,321,000 tons moved during all of 1956.

Shipments of Lake Superior ore in the week ended Oct. 7 totaled 2,916,313 gross tons. Comparison: 2,756,934 in the like week last year. Cumulative shipments in the 1957 season to Oct. 7 were 72,068,057 tons, up 15,010,703 from the 57,057,354 tons moved in the like period of the 1956 season.

Shipments Set Record

Record shipments of 56,392,714 net tons of finished steel products were reported by the American Iron & Steel Institute for the first eight months of this year. This compares with 55,432,982 tons (the previous record) shipped in the like period of 1953, and with the 53.8 million tons shipped in the first eight months of 1956.

Principal products shipped in the period this year were cold rolled sheets (7.8 million tons), plates (6.6 million), hot rolled sheets (5.5 million), hot rolled bars (5.4 million), and heavy structural shapes (4.6 million).

During August shipments totaled 6,229,853 net tons, compared with 5,877,133 in July this year and 5,539,915 in August a year ago.

The five leading groups receiving finished steel during the first eight months this year were: Construction (including maintenance and contractors' products), 11 million tons; warehouses and distributors, 10.6 million; automotive, 9.2 million; containers, 4.7 million;

and machinery, industrial equipment, and tools, 3.3 million.

Structural Shapes . . .

Structural Shape Prices, Page 190

Less structural steel tonnage is coming out for fabricators' estimates. Inquiries for bridges and schools are holding up fairly well, but shipments of most fabricating shops exceed new bookings. The margin would be even greater than it is if steel were in more plentiful supply.

At that, supply conditions are much better than they were a few months ago. Wide flange beams continue scarce, but standard shapes are available in ample volume. Except for heavy wide flange sections, acute shortages of structurals have been eliminated. Wide flange deliveries are four to five weeks behind, on the average. Some buyers report shipments are two months behind schedule.

Light shapes rolled on bar mills are in free supply. Heavier shapes, including angles and channels, are generally easing, although one important supplier in the Pittsburgh area is running about a month behind on deliveries.

An eastern producing mill that had been charging premium prices on standard structurals is not operating. Most structural mills probably will get current on shipping schedules before yearend.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

3400 tons, five-span, 1135-ft, welded girder, open deck bridge, Route 9, Mohawk River, Crescent, N. Y.; 2500 tons, plate girders, to By-Products Div., Lukens Steel Co., Coatesville, Pa., remainder to be placed; Terry Contracting Co., New York, general contractor.

3200 tons, 1620-ft bridge, including 310-ft vertical lift section, Illinois River, Wabash Railroad, Valley City, Ill., to Mount Vernon Bridge Co., Mt. Vernon, Ohio.

240 tons, Montana State, Cascade County underpass, to an unstated fabricator; general contract to the Sletten Construction Co., Great Falls, Mont.

240 tons, three-span composite WF beam bridge, Montpelier, Vt., to the Vermont Structural Steel Co., Burlington, Vt.; S. V. Rossi Co., Torrington, Conn., is general contractor.

205 tons, bridges and highway structures, Henry and Williams counties, Ohio, to the Bethehem Steel Co., Bethlehem, Pa.; E. K. Bridge Construction Co., Toledo, Ohio, general contractor.

145 tons, Mt. Desert bridge, Trenton, Maine, to the Bancroft & Martin Rolling Mills Co., South Portland, Maine; H. E. Sargent Co., Stillwater, Maine, is general contractor.

120 tons, state highway bridge, Rochester, N. H., to the Bancroft & Martin Rolling Mills Co., South Portland, Maine; Landers & Griffith Co., Manchester, N. H., is general contractor.

120 tons, dormitory, Louisiana Polytechnic Institute, Rushton, La., to Mosher Steel Co., Houston; J. M. Brown Construction Co., Shreveport, La., general contractor.

105 tons, high school, Guilford, Conn., to the New England Iron Works Inc., New Haven, Conn.; Giordano Construction Co., Branford, Conn., general contractor; 40 tons of reinforcing steel went to the Fox Steel Co., Orange, Conn.

STRUCTURAL STEEL PENDING

700 tons, state highway bridges, Middleboro, Mass.; bids Oct. 15, Boston.

640 tons, also 50 tons of reinforcing steel, span in Skamania County, Washington; bids in to the Bureau of Public Roads, Portland, Oreg.

370 tons, wide flange, U. S. Engineer, San Francisco, two contracts; bids in.

240 tons, state highway bridges, Southeast Expressway, Weymouth, Mass.

100 tons, addition to Boeing Field hangar; bids to commissioners, King County, Seattle. Oct. 28.

REINFORCING BARS . . .

REINFORCING BARS PLACED

810 tons, 11 bridges, ramps and interchanges Southeast Expressway, Braintree-Weymouth, Mass., to Northern Steel Inc., Medford, Mass.; J. F. White Contracting Co., Westwood, Mass., general contractor; 1025 tons fabricated structural steel, to West End Iron Works, Cambridge, Mass.

535 tons, bridge structures and ramps, Dayton, Ohio, to Truscon Steel Div., Republic Steel Corp., Youngstown; Maxon Construction Co., Dayton, general contractor; 60 tons, fabricated structural steel, to International Steel Co., Evansville, Ind.

465 tons, building, state hospital, Foxboro Mass., to Northern Steel Inc., Medford, Mass.; M. S. Kelliher Co., Boston, is general contractor.

400 tons, state highway bridges, Stoneham-Woburn-Reading, Mass., to Northern Steel Inc., Medford, Mass.; Consolidated Builders Co., North Attleboro, Mass., is general contractor.

150 tons, North Junior High School, Brockton, Mass., to the Joseph T. Ryerson & Son Inc., Boston; L. & R. Construction Co., Reading, Mass., is general contractor.

140 tons, school, Essex, Mass., to Joseph T. Ryerson & Son Inc., Boston; Poorvu Construction Co., Boston, is general contractor.

115 tons, highway structures, Henry and Williams counties, Ohio, to the Pollak Steel Co., Cincinnati; E. K. Bridge Construction Co., Toledo, Ohio, is general contractor.

100 tons, Washington State underpass, Lewis County, to the Soule Steel Co., Seattle; general contract to the Pakar Construction Co., Chehalis, Wash., low at $185,405.

REINFORCING BARS PENDING

260 tons, Washington State, Whatcom County, two slab bridges; general contract to S. S. Mullen Inc., Seatte, low at $219,586.

115 tons, Washington State, Whatcom County, slab bridge; Osberg Construction Co., Seattle, awarded at $1,089,713.

100 tons, Washington State road projects, Pacific and Thurston counties; bids to Olympia, Wash., Oct. 22.

37 tons, plus miscellaneous steel, 130-ft girder bridge, Malhuer County, Oregon; bids to the Bureau of Public Roads, Portland, Oreg., Oct. 18

PLATES . . .

PLATES PENDING

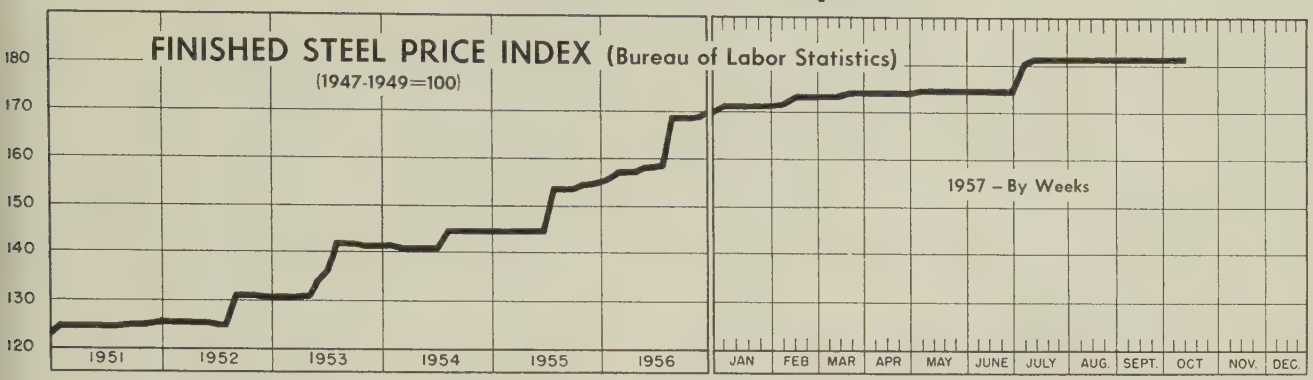
4500 tons, estimated, large diameter welded pipe, two sections and contracts, Water Division, Board of Public Service, St. Louis; National Tank & Boiler Co., St. Louis, total $4,132,852.

PIPE . . .

CAST IRON PIPE PENDING

1686 tons, 16 to 4 in.; several district projects; bids in to Seattle.

Price Indexes and Composites



Oct. 8, 1957	Week Ago	Month Ago	Sept. Avg.	Year Ago
181.8	181.8	181.5	181.5	168.6

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Oct. 8

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard, No. 1	$5.600	Bars, Reinforcing	6.210
Rails, Light, 40 lb	7.067	Bars, C.F., Carbon	10.360
Tie Plates	6.600	Bars, C.F., Alloy	13.875
Axles, Railway	9.825	Bars, C.F., Stainlesss, 302 (lb)	0.553
Wheels, Freight Car, 33 in. (per wheel)	60.000	Sheets, H.R., Carbon	6.192
Plates, Carbon	6.150	Sheets, C.R., Carbon	7.089
Structural Shapes	5.942	Sheets, Galvanized	8.220
Bars, Tool Steel, Carbon (lb)	0.535	Sheets, C.R., Stainless, 302 (lb)	0.688
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.650	Sheets, Electrical	12.025
Bars, Tool Steel, H.R., Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.404	Strip, C.R., Carbon	9.243
Bars, Tool Steel, H.R., Alloy, High Speed, W 18, Cr 4, V 1 (lb)	1.899	Strip, C.R., Stainless, 430 (lb)	0.493
Bars, H.R., Alloy	10.525	Strip, H.R., Carbon	6.245
Bars, H.R., Stainless, 303 (lb)	0.525	Pipe, Black, Buttweld (100 ft)	19.814
Bars, H.R., Carbon	6.425	Pipe, Galv., Buttweld (100 ft)	23.264
		Pipe, Line (100 ft)	199.023
		Casing, Oil Well, Carbon (100 ft)	194.499
		Casing, Oil Well, Alloy (100 ft)	304.610
		Tubes, Boiler (100 ft)	49.130
		Tubing, Mechanical, Carbon (100 ft)	24.953
		Tubing, Mechanical, Stainless, 304 (100 ft)	205.608
		Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	9.783
		Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.483
		Black Plate, Canmaking Quality (95 lb base box)	7.583
		Wire, Drawn, Carbon	10.225
		Wire, Drawn, Stainless, 430 (lb)	0.653
		Bale Ties (bundles)	7.967
		Nails, Wire, 8d Common	9.828
		Wire, Barbed (80-rod spool)	8.719
		Woven Wire Fence (20-rod roll)	21.737

STEEL's FINISHED STEEL PRICE INDEX*

	Oct. 9 1957	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	239.15	239.15	239.15	225.58	181.40
Index in cents per lb	6.479	6.479	6.479	6.111	4.914

STEEL's ARITHMETICAL PRICE COMPOSITES*

Finished Steel, NT	$146.03	$146.03	$146.19	$137.48	$111.66
No. 2 Fdry Pig Iron, GT	66.49	66.49	66.49	62.63	55.04
Basic Pig Iron, GT	65.99	65.99	65.99	62.18	54.66
Malleable Pig Iron, GT	67.27	67.27	67.27	63.41	55.77
Steelmaking Scrap, GT	39.50	42.17	50.17	57.00	43.00

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point

FINISHED STEEL

	Oct. 9 1957	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.425	5.425	5.425	5.075	3.95
Bars, H.R., Chicago	5.425	5.425	5.425	5.075	3.95
Bars, H.R., deld., Philadelphia	5.725	5.725	5.725	4.93	4.502
Bars, C.F., Pittsburgh	7.30*	7.30*	7.30*	6.85*	4.925
Shapes, Std., Pittsburgh	5.275	5.275	5.275	5.00	3.85
Shapes, Std., Chicago	5.275	5.275	5.275	5.00	3.85
Shapes, deld., Philadelphia	5.545	5.545	5.545	5.00	4.13
Plates, Pittsburgh	5.10	5.10	5.10	4.85	3.90
Plates, Chicago	5.10	5.10	5.10	4.85	3.90
Plates, Coatesville, Pa.	5.10	5.50	5.50	5.25	4.35
Plates, Sparrows Point, Md.	5.10	5.10	5.10	4.85	3.90
Plates, Claymont, Del.	5.70	5.70	5.70	5.35	4.35
Sheets, H.R., Pittsburgh	4.925	4.925	4.925	4.675	3.775
Sheets, H.R., Chicago	4.925	4.925	4.925	4.675	3.775
Sheets, C.R., Pittsburgh	6.05	6.05	6.05	5.75	4.575
Sheets, C.R., Chicago	6.05	6.05	6.05	5.75	4.575
Sheets, C.R., Detroit	6.05-6.15	6.05-6.15	6.05-6.15	5.75-5.85	4.775
Sheets, Galv., Pittsburgh	6.60	6.60	6.60	6.30	5.075
Strip, H.R., Pittsburgh	4.925	4.925	4.925	4.675	3.75-4.225
Strip, H.R., Chicago	4.925	4.925	4.925	4.675	3.725
Strip, C.R., Pittsburgh	7.15	7.15	7.15	6.85	5.10-5.80
Strip, C.R., Chicago	7.15	7.15	7.15	6.85	5.35
Strip, C.R., Detroit	7.25	7.25	7.25	6.95	5.30-6.05
Wire, Basic, Pittsburgh	7.65	7.65	7.65	7.20	5.10-5.225
Nails, Wire, Pittsburgh	8.95	8.95	8.95	8.20	6.20-6.35
Tin plate (1.50 lb) box, Pitts.	$10.30	$10.30	$10.30	$9.85	$8.95

*Including 0.35c for special quality.

SEMIFINISHED STEEL

Billets, forging, Pitts. (NT)	$96.00	$96.00	$96.00	$91.50	$70.50
Wire rods, 7/32-5/8" Pitts.	6.15	6.15	6.15	5.80	4.325

PIG IRON, Gross Ton

	Oct. 9 1957	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pitts.	$67.00	$67.00	$67.00	$63.50	$55.50
Basic, Valley	66.00	66.00	66.00	62.50	54.50
Basic, deld., Phila.	70.01	70.01	70.01	66.26	59.25
No. 2 Fdry, NevilleIsland,Pa.	66.50	66.50	66.50	63.00	55.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	63.00	55.00
No. 2 Fdry, deld., Phila.	70.51	70.51	70.51	66.76	59.75
No. 2 Fdry, Birm.	62.50	62.50	62.50	59.00	51.38
No. 2 Fdry(Birm.)deld. Cin.	70.20	70.20	70.20	66.70	58.93
Malleable, Valley	66.50	66.50	66.50	63.00	55.00
Malleable, Chicago	66.50	66.50	66.50	63.00	55.00
Ferromanganese, Duquesne.	245.00†	245.00†	255.00†	235.00†	228.00*

†74-76% Mn, net ton. *75-82% Mn, gross ton, Etna, Pa.

SCRAP, Gross Ton (Including broker's commission)

No. 1 Heavy Melt, Pittsburgh	$40.50	$42.50	$51.50	$56.50	$44.00
No. 1 Heavy Melt, E. Pa.	38.50	41.00	48.00	56.50	41.50
No. 1 Heavy Melt, Chicago.	39.50	43.00	51.00	58.00	42.50
No. 1 Heavy Melt, Valley.	38.50	40.50	52.50	64.50	44.00
No. 1 Heavy Melt, Cleve.	36.50	38.50	49.50	63.00	43.00
No. 1 Heavy Melt, Buffalo.	38.50	41.50	47.50	57.50	43.00
Rails, Rerolling, Chicago	57.50	59.50	65.50	83.00	52.50
No. 1 Cast, Chicago	38.50	40.50	44.50	50.50	50.00

COKE, Net Ton

Beehive, Furn., Connlsvl.	$15.25	$15.25	$15.25	$14.50	$14.75
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	17.50	17.00

Steel Prices

Mill prices as reported to STEEL, Oct. 9, cents per pound except as otherwise noted. *Changes shown in italics* Code numbers following mill points indicate producing company. Key to producers, page 191; to footnotes page 193.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 .....$73.50

INGOTS, Alloy (NT)
Detroit S41 .....$77.00
Farrell,Pa. S3 .....77.00
Lowellville,O. S3 .....77.00
Midland,Pa. C18 .....77.00
Munhall,Pa. U5 .....77.00
Sharon,Pa. S3 .....77.00

BILLETS, BLOOMS & SLABS
Carbon, Rerolling (NT)
Bessemer,Pa. U5 ....$77.50
Bridgeport,Conn. N19 ..80.50
Buffalo R2 .....77.50
Clairton,Pa. U5 .....77.50
Ensley,Ala. T2 .....77.50
Fairfield,Ala. T2 .....77.50
Fontana,Calif. K1 ....88.00
Gary,Ind. U5 .....77.50
Johnstown,Pa. B2 ....77.50
Lackawanna,N.Y. B2..77.50
Munhall,Pa. U5 .....77.50
S.Chicago,Ill. R2, U5..77.50
S.Duquesne,Pa. U5 ....77.50
Sterling,Ill. N15 .....77.50
Youngstown R2 .....77.50

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$96.00
Bridgeport,Conn. N19.101.00
Buffalo R2 .....96.00
Canton,O. R2 .....98.50
Clairton,Pa. U5 .....96.00
Conshohocken,Pa. A3.101.00
Ensley,Ala. T2 .....96.00
Fairfield,Ala. T2 .....96.00
Fontana,Calif. K1....105.50
Gary,Ind. U5 .....96.00
Geneva,Utah C11 .....96.00
Houston S5 .....101.00
Johnstown,Pa. B2 .....96.00
Lackawanna,N.Y. B2..96.00
LosAngeles B3 .....105.50
Midland,Pa. C18 .....96.00
Munhall,Pa. U5 .....96.00
Seattle B3 .....109.50
Sharon,Pa. S3 .....96.00
S.Chicago R2,U5,W14..96.00
S.Duquesne,Pa. U5 ....96.00
S.SanFrancisco B3 ...105.50
Warren,O. C17 .....96.00

Alloy, Forging (NT)
Bethlehem,Pa. B2 ...$114.00
Bridgeport,Conn. N19.114.00
Buffalo R2 .....114.00
Canton,O. R2, T7 ....114.00
Conshohocken,Pa. A3..121.00
Detroit S41 .....114.00
Economy,Pa. B14 ....114.00
Farrell,Pa. S3 .....114.00
Fontana,Calif. K1 ....135.00
Gary,Ind. U5 .....114.00
Houston S5 .....119.00
Ind.Harbor,Ind. Y1 ..114.00
Johnstown,Pa. B2 ...114.00
Lackawanna,N.Y. B2.114.00
LosAngeles B3 .....134.00
Lowellville,O. S3 ....114.00
Massillon, O. R2 ....114.00
Midland,Pa. C18 ....114.00
Munhall,Pa. U5 .....114.00
Sharon,Pa. S3 .....114.00
S.Chicago R2,U5,W14..114.00
S.Duquesne,Pa. U5 ...114.00
Struthers,O. Y1 .....114.00
Warren,O. C17 .....114.00

ROUNDS, SEAMLESS TUBE (NT)
Bridgeport,Conn. N19 $122.50
Buffalo R2 .....117.50
Canton,O. R2 .....120.00
Cleveland,O. R2 .....117.50
Gary, Ind. U5 .....117.50
S.Chicago,Ill. R2, W14 117.50
S.Duquesne,Pa. U5 ...117.50
Warren,O. C17 .....117.50

SKELP
Aliquippa,Pa. J5 .....5.075
Munhall,Pa. U5 .....4.875
Warren,O. R2 .....4.875
Youngstown R2, U5 ..4.875

WIRE RODS
AlabamaCity,Ala. R2 ..6.15
Aliquippa,Pa. J5 .....6.15
Alton,Ill. L1 .....6.35
Buffalo W12 .....6.15
Cleveland A7 .....6.15
Donora,Pa. A7 .....6.15
Fairfield,Ala. T2 .....6.15
Houston S5 .....6.40
IndianaHarbor,Ind. Y1..6.15
Johnstown,Pa. B2 .....6.15
Joliet,Ill. A7 .....6.15
KansasCity,Mo. S5 ....6.40
Kokomo,Ind. C16 .....6.25
LosAngeles B3 .....6.95
Minnequa,Colo. C10 ....6.40
Monessen,Pa. P17 .....6.15
N.Tonawanda,N.Y. B11..6.15
Pittsburg,Calif. C11 ....6.95
Portsmouth,O. P12 ....6.15
Roebling,N.J. R5 .....6.25
S.Chicago,Ill. R2 .....6.15
SparrowsPoint,Md. B2 ..6.25
Sterling,Ill. (1) N15 ....6.15
Sterling,Ill. N15 .....6.25
Struthers,O. Y1 .....6.15
Worcester,Mass. A7 ....6.45

STRUCTURALS

Carbon Steel Std. Shapes
Ala.City,Ala. R2 ....5.275
Atlanta A11 .....5.475
Aliquippa,Pa. J5 .....5.275
Bessemer,Ala. T2 .....5.275
Bethlehem,Pa. B2 .....5.325
Birmingham C15 .....5.275
Clairton,Pa. U5 .....5.275
Fairfield,Ala. T2 .....5.275
Fontana,Calif. K1 .....6.075
Gary,Ind. U5 .....5.275
Geneva,Utah C11 .....5.275
Houston S5 .....5.375
Ind.Harbor,Ind. I-2 ....5.275
Johnstown,Pa. B2 ....5.325
Joliet,Ill. P22 .....5.275
KansasCity,Mo. S5 ....5.375
Lackawanna,N.Y. B2..5.325
LosAngeles B3 .....5.975
Minnequa,Colo. C10 ...5.57b
Munhall,Pa. U5 .....5.275
Niles,Calif. P1 .....5.925
Phoenixville,Pa. P4 ...5.325
Portland,Oreg. O4 ....6.025
Seattle B3 .....6.025
S.Chicago,Ill, U5, W14..5.275
S.SanFrancisco B3 ....5.925
Sterling,Ill. N15 .....5.275
Torrance,Calif. C11 ...5.975
Weirton,W.Va. W6 ....5.275

Wide Flange
Bethlehem,Pa. B2 .....5.325
Clairton,Pa. U5 .....5.275
Fontana,Calif. K1 ....6.225
IndianaHarbor,Ind. I-2..5.525
Lackawanna,N.Y. B2 ..5.325
Munhall,Pa. U5 .....5.275
Phoenixville,Pa. P4 ....5.50
S.Chicago,Ill. U5 .....5.275

Alloy Std. Shapes
Aliquippa,Pa. J5 .....6.55
Clairton,Pa. U5 .....6.55
Gary,Ind. U5 .....6.55
Houston S5 .....6.65
KansasCity,Mo. S5 ....6.65
Munhall,Pa. U5 .....6.55
S.Chicago,Ill. U5 .....6.55

H.S., L.A. Std. Shapes
Aliquippa,Pa. J5 .....7.75
Bessemer,Ala. T2 .....7.75
Bethlehem,Pa. B2 ....7.80
Clairton,Pa. U5 .....7.75
Fairfield,Ala. T2 .....7.75
Fontana,Calif. K1 .....8.55
Gary,Ind. U5 .....7.75
Geneva,Utah C11 .....7.75
Houston S5 .....7.85
Ind.Harbor,Ind. I-2, Y1 7.75
Johnstown,Pa. B2 .....7.80
KansasCity,Mo. S5 ....7.85
Lackawanna,N.Y. B2 ...7.80
LosAngeles B3 .....8.45
Munhall,Pa. U5 .....7.75
Seattle B3 .....8.50
S.Chicago,Ill. U5, W14..7.75
S.SanFrancisco B3 .....8.40
Struthers,O. Y1 .....7.75

H.S., L.A. Wide Flange
Bethlehem,Pa. B2 .....7.80
Lackawanna,N.Y. B2 ...7.80
Munhall,Pa. U5 .....7.75
S.Chicago,Ill. U5 .....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 .....5.325
Lackawanna,N.Y. B2 ..5.325
Munhall,Pa. U5 .....5.275
S.Chicago,Ill. U5 .....5.275

STEEL SHEET PILING
Lackawanna,N.Y. B2 ..6.225
Munhall,Pa. U5 .....6.225
S.Chicago,Ill. U5 .....6.225

PLATES

PLATES, Carbon Steel
Ala.City,Ala. R2 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky. (15) A10...5.10
Bessemer,Ala. T2 .....5.10
Clairton,Pa. U5 .....5.10
Claymont,Del. C22 .....5.70
Cleveland J5, R2 .....5.20
Coatesville,Pa. L7 .....5.10
Conshohocken,Pa. A3 ..5.20
Ecorse,Mich. G5 .....5.20
Fairfield,Ala. T2 .....5.10
Fontana,Calif.(30) K1 .5.90
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.10
GraniteCity,Ill. G4 .....5.30
Harrisburg,Pa. P4 .....5.80
Houston S5 .....5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Johnstown,Pa. B2 .....5.10
Lackawanna,N.Y. B2 ..5.10
LoneStar,Tex. L6 .....5.45
Mansfield,O. E6 .....5.10
Minnequa,Colo. C10 ....5.95
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Pittsburgh J5 .....5.10
Riverdale,Ill. A1 .....5.10
Seattle B3 .....6.00
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14 5.10
SparrowsPoint,Md. B2 ..5.10
Sterling,Ill. N15 .....5.10
Steubenville,O. W10 ....5.10
Warren, O. R2 .....5.10
Youngstown R2, U5, Y1.5.10

PLATES, Carbon Abras. Resist.
Claymont,Del. C22 .....7.35
Fontana,Calif. K1 .....7.55
Geneva,Utah C11 .....6.75
Houston S5 .....6.85
Johnstown,Pa. B2 ..... 6.75
SparrowsPoint,Md. B2 ..6.75

PLATES, Wrought Iron
Economy,Pa. B14 .....13.15

PLATES, H.S., L.A.
Aliquippa,Pa. J5 .....7.625
Bessemer,Ala. T2 .....7.625
Clairton,Pa. U5 .....7.625
Claymont,Del. C22 .....7.625
Cleveland J5, R2 .....7.625
Coatesville,Pa. L7 .....7.925
Conshohocton,Pa. A3....7.625
Economy,Pa. B14 .....7.625
Ecorse,Mich. G5 .....7.725
Fairfield,Ala. T2 .....7.625
Farrell,Pa. S3 .....7.625
Fontana,Calif.(30) K1..8.425
Gary,Ind. U5 .....7.625
Geneva,Utah C11 .....7.625
Houston S5 .....7.725
Ind.Harbor,Ind. I-2, Y1 7.625
Johnstown,Pa. B2 .....7.625
Munhall,Pa. U5 .....7.625
Pittsburgh J5 .....7.625
Seattle B3 .....8.525
Sharon,Pa. S3 .....7.625
S.Chicago,Ill. U5, W14 7.625
SparrowsPoint,Md. B2..7.625
Warren,O. R2 .....7.625
Youngstown U5 .....7.625

PLATES, ALLOY
Aliquippa,Pa. J5 .....7.20
Claymont,Del. C22 .....7.20
Coatesville,Pa. L7 .....7.20
Economy,Pa. B14 .....7.20
Farrell,Pa. S3 .....7.20
Fontana,Calif.(30) K1 ..8.00
Gary,Ind. U5 .....7.20
Houston S5 .....7.30
Ind.Harbor,Ind Y1 .....7.20
Johnstown,Pa. B2 .....7.20
Lowellville,O. S3 .....7.20
Munhall,Pa. U5 .....7.20
Newport,Ky. A2 .....7.20
Pittsburgh J5 .....7.20
Seattle B3 .....8.10
Sharon,Pa. S3 .....7.20
S.Chicago,Ill. U5, W14..7.20
SparrowsPoint,Md. B2..7.20
Youngstown Y1 .....7.20

FLOOR PLATES
Cleveland J5 .....6.175
Conshohocken,Pa. A3 ..6.175
Ind Harbor,Ind. I-2 ...6.175
Munhall,Pa U5 .....6.175
S.Chicago,Ill. U5 .....6.175

PLATES, Ingot Iron
Ashland c.l. (15) A10...5.35
Ashland l.c.l. (15) A10..5.85
Cleveland c.l. R2 .....5.85
Warren,O. c.l. R2 .....5.85

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ..5.425
Aliquippa,Pa.(9) J5 ....5.425
Alton,Ill. L1 .....5.625
Atlanta(9) A11 .....5.625
Bessemer,Ala.(9) T2 ...5.425
Birmingham(9) C15 ...5.425
Bridgeport,Conn.(9) N19 5.65
Buffalo(9) R2 .....5.425
Clairton,Pa. (9) U5 ....5.425
Cleveland(9) R2 .....5.425
Ecorse,Mich.(9) G5 ...5.525
Emeryville,Calif. J7 ...6.175
Fairfield,Ala.(9) T2 ..5.425
Fairless,Pa. (9) U5 ....5.575
Fontana,Calif.(9) K1 ..6.125
Gary,Ind.(9) U5 .....5.425
Houston(9) S5 .....5.675
Ind.Harbor(9) I-2, Y1.5.425
Johnstown,Pa.(9) B2 ..5.425
Joliet,Ill. P22 .....5.425
KansasCity,Mo.(9) S5..5.675
Lackawanna(9) B2 ....5.425
LosAngeles(9) B3 .....6.125
Milton,Pa. M18 .....5.575
Minnequa,Colo. C10 ...5.875
Niles,Calif. P1 .....6.125
N.T'wanda,N.Y.(46)B11 5.775
Pittsburg,Calif.(9) C11.6.125
Pittsburgh(9) J5 .....5.425
Portland,Oreg. O4 .....6.175
Seattle B3, N14 .....6.175
S.Ch'c'go(9)R2,U5,W14 5.425
S.Duquesne,Pa.(9) U5..5.425
S.SanFran.,Calif.(9)B3 6.175
Sterling,Ill.(1)(9) N15..5.425
Sterling,Ill.(9) N15 ....5.525
Struthers,O. Y1 .....5.425
Tonawanda,N.Y. B12 ..5.425
Torrance,Calif.(9) C11.6.125
Youngstown(9) R2, U5.5.425

BARS, H.R. Leaded Alloy (Including leaded extra)
Warren,O. C17 .....7.475

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.475
Bethlehem,Pa. B2 .....6.475
Bridgeport,Conn. N19 ..6.55
Buffalo R2 .....6.475
Canton,O. R2, T7 .....6.475
Clairton,Pa. U5 .....6.475
Detroit S41 .....6.475
Economy,Pa. B14 .....6.475
Ecorse,Mich. G5 .....6.575
Fairless,Pa. U5 .....6.625
Farrell,Pa. S3 .....6.475
Fontana,Calif. K1 ....7.525
Gary,Ind. U5 .....6.475
Houston S5 .....6.725
Ind.Harbor,Ind. I-2, Y1 6.475
Johnstown,Pa. B2 .....6.475
KansasCity,Mo. S5 ....6.725
Lackawanna,N.Y. B2 ..6.475
Lowellville,O. S3 .....6.475
LosAngeles B3 .....7.525
Massillon,O. R2 .....6.475
Midland,Pa. C18 .....6.475
Pittsburgh J5 .....6.475
Sharon,Pa. S3 .....6.475
S.Chicago R2, U5, W14 6.475
S.Duquesne,Pa. U5 ....6.475
Struthers,O. Y1 .....6.475
Warren,O. C17 .....6.475
Youngstown U5 .....6.475

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 .....7.925
Bessemer,Ala. T2 .....7.925
Bethlehem,Pa. B2 .....7.925
Bridgeport,Conn. N19 ..7.95
Clairton,Pa. U5 .....7.925
Cleveland R2 .....7.925
Ecorse,Mich. G5 .....8.025
Fairfield,Ala. T2 .....7.925
Fontana,Calif. K1 .....8.625
Gary,Ind. U5 .....7.925
Houston S5 .....8.175
Ind.Harbor,Ind. Y1 ....7.925
Johnstown,Pa. B2 .....7.925
KansasCity,Mo. S5 ....8.175
Lackawanna,N.Y. B2..7.925
LosAngeles B3 .....8.625
Pittsburgh J5 .....7.925
Seattle B3 .....8.675
S.Chicago,Ill. U5, W14 7.925
S.Duquesne,Pa. U5 ....7.925
S.SanFrancisco B3 ....8.675
Struthers,O. Y1 .....7.925
Youngstown U5 .....7.925

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ..5.575
Houston(9) S5 .....5.675
KansasCity,Mo.(9) S5..5.675
Lackawanna(9) B2 ...5.425
Sterling,Ill. N15 .....5.525
Sterling,Ill.(1) N15 ...5.425
Tonawanda,N.Y. B12 ..5.425

BAR SIZE ANGLES; S. Shapes
Aliquippa,Pa. J5 .....5.425
Atlanta A11 .....5.625
Joliet,Ill. P22 .....5.425
Niles,Calif. P1 .....6.125
Pittsburgh J5 .....5.425
Portland,Oreg. O4 ....6.175
SanFrancisco S7 .....6.275
Seattle B3 .....6.175

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.55
Clairton,Pa. U5 .....6.55
Gary,Ind. U5 .....6.55
Houston S5 .....6.86
KansasCity,Mo. S5 ....6.86
Pittsburgh J5 .....6.55
Youngstown U5 .....6.55

Bars, C.F., Leaded Alloy (Including leaded extra)
Ambridge,Pa. W18 ...9.925
BeaverFalls,Pa. M12 ..9.925
Camden,N.J. P13 ....10.10
Chicago W18 .....9.925
Cleveland C20 .....9.925
Elyria,O. W8 .....9.925
LosAngeles P2, S30
(Grade A) 11.30
(Grade B) 11.80
Monaca,Pa. S17 .....9.925
Newark,N.J. W18 ....10.10
SpringCity,Pa. K3 ....10.10
Warren,O. C17 .....9.925

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ....7.30
BeaverFalls,Pa. M12,R2 7.30
Birmingham C15 .....7.90
Bridgeport,Conn. N19 ..7.65
Buffalo B5 .....7.35
Camden,N.J. P13 .....7.75
Carnegie,Pa. C12 .....7.30
Chicago W18 .....7.30
Cleveland A7, C20 ....7.30
Detroit B5, P17 .....7.80
Detroit S41 .....7.30
Donora,Pa. A7 .....7.30
Elyria,O. W8 .....7.30
FranklinPark,Ill. N5 ...7.30
Gary,Ind R2 .....7.30
GreenBay,Wis. F7 .....7.30
Hammond,Ind. J5, L2 ..7.30
Hartford,Conn. R2 ....7.90
Harvey,Ill. B5 .....7.30
LosAngeles P2, S30 ....8.75
LosAngeles R2 .....8.75
Mansfield,Mass. B5 ....7.85
Massillon,O. R2, R8 ....7.30
Midland,Pa. C18 .....7.30
Monaca,Pa. S17 .....7.30
Newark,N.J. W18 .....7.75
NewCastle,Pa.(17) B4 ..7.30
Pittsburgh J5 .....7.30
Plymouth,Mich. P5 ....7.55
Putnam,Conn. W18 ....7.85
Readville,Mass. C14 ....7.80
S.Chicago,Ill. W14 ....7.30
SpringCity,Pa. K3 .....7.75
Struthers,O. Y1 .....7.30
Warren,O. C17 .....7.30
Willimantic,Conn. J5 ...7.80
Waukegan,Ill. A7 .....7.30
Youngstown F3, Y1 ....7.30

BARS, Cold-Finished Carbon (Turned and Ground)
Cumberland,Md.(5) C19.6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....8.775
BeaverFalls,Pa.M12,R2 8.775
Bethlehem,Pa. B2 .....8.775
Bridgeport,Conn. N19 ..8.925
Buffalo B5 .....8.775
Camden,N.J. P13 .....8.95
Canton,O. T7 .....8.775
Carnegie,Pa. C12 .....8.775
Chicago W18 .....8.775
Cleveland A7, C20 ....8.775
Detroit B5, P17 .....8.975
Detroit S41 .....8.775
Donora,Pa. A7 .....8.775
Elyria,O. W8 .....8.775
FranklinPark,Ill. N5 ..8.775
Gary,Ind. R2 .....8.775
GreenBay,Wis. F7 .....8.775
Hammond,Ind. J5, L2..8.775
Hartford,Conn. R2 ....9.075
Harvey,Ill B5 .....8.775
Lackawanna,N.Y. B2 ..8.775
LosAngeles P2, S30 ...10.65
Mansfield,Mass. B5 ...9.075
Massillon,O. R2, R8 ...8.775
Midland,Pa. C18 .....8.775
Monaca,Pa. S17 .....8.775
Newark,N.J. W18 .....8.95
Plymouth,Mich. P5 ...8.975
S.Chicago W14 .....8.775
SpringCity,Pa. K3 .....8.95
Struthers,O. Y1 .....8.775
Warren,O. C17 .....8.775
Waukegan,Ill. A7 .....8.775
Worcester,Mass. A7 ...9.075
Youngstown F3, Y1 ..8.775

BARS, Reinforcing (To Fabricators)

Ala.City,Ala. R2 .....5.425
Atlanta A11 .....5.625
Birmingham C15, S42 5.425
Bridgeport,Conn. N19 ...5.65
Buffalo R2 .....5.425
Cleveland R2 .....5.425
Ecorse,Mich. G5 .....5.775
Emeryville,Calif. J7 ..6.175
Fairfield,Ala. T2 .....5.425
Fairless,Pa. U5 .....5.575
Fontana,Calif. K1 .....6.125
Ft.Worth,Tex.(4)(26)T4 5.875
Gary, Ind. U5 .....5.425
Houston S5 .....5.675
Ind.Harbor,Ind. I-2,Y1 5.425
Johnstown,Pa. B2 .....5.425
Joliet,Ill. P22 .....5.425
KansasCity,Mo. S5 .....5.675
Lackawanna,N.Y. B2 ..5.425
LosAngeles B3 .....6.125
Milton,Pa. M18 .....5.575
Minnequa,Colo, C10 ...5.875
Niles,Calif. P1 .....6.125
Pittsburg,Calif. C11 ..6.125
Pittsburgh J5 .....5.425
Portland,Oreg. O4 .....6.175
SandSprings,Okla. S5 ..5.925
Seattle B3, N14 .....6.175
S.Chicago,Ill. R2 .....5.425
S.Duquesne,Pa. U5 ....5.425
S.SanFrancisco B3 .....6.175
SparrowsPoint,Md. B2..5.425
Sterling,Ill.(1) N15 ...5.425
Sterling, Ill. N15 .....5.525
Struthers,O. Y1 .....5.425
Tonawanda,N.Y. B12 ...6.00
Torrance,Calif. C11 ....6.125
Youngstown R2, U5 ..5.425

BARS, Reinforcing (Fabricated; to Consumers)

Boston B2 .....7.56
Chicago U8 .....6.91
Cleveland U8 .....6.89
Johnstown,Pa. B2 .....7.08
KansasCity,Mo. S5 .....7.35
Lackawanna,N.Y. B2 ..6.85
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.55
Pittsburgh J5, U8 ....7.10
Seattle B3, N14 .....7.70
SparrowsPt.,Md. B2 ....7.08
Williamsport,Pa. S19 ..7.00

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 14.45
Economy,Pa.(D.R.)B14 18.00
Economy,(Staybolt)B14 18.45

RAIL STEEL BARS

ChicagoHts.(3) C2, I-2.5.325
ChicagoHts.(4)(44) I-2.5.425
ChicagoHts.(4) C2 ....5.425
Ft.Worth,Tex.(26) T4..5.875
Franklin,Pa. (3) F5 ..5.325
Franklin,Pa. (4) F5 ...5.425
JerseyShore,Pa.(3) J8 ..5.30
Marion,O.(3) P11 ....5.325
Tonawanda(3) R12 ....5.325
Tonawanda(4) B12 ....6.00
Williamsport,Pa. (3)S19 5.50

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

Ala.City,Ala. R2 .....4.925
Allenport,Pa. P7 .....4.925
Ashland,Ky.(8) A10 ..4.925
Cleveland J5, R2 ....4.925
Conshohocken,Pa. A3 ..4.975
Detroit(8) M1 .....5.025
Ecorse,Mich. G5 .....5.025
Fairfield,Ala. T2 .....4.925
Fairless,Pa. U5 .....4.975
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....4.925
Geneva,Utah C11 .....5.025
GraniteCity,Ill.(8) G4 ..5.125
Ind.Harbor,Ind. I-2, Y1 4.925
Irvin,Pa. U5 .....4.925
Lackawanna,N.Y. B2 ..4.925
Mansfield,O. E6 .....4.925
Munhall,Pa. U5 .....4.925
Newport,Ky.(8) A2 ..4.925
Niles,O. M21, S3 ....4.925
Pittsburg,Calif. C11 ..5.625
Pittsburgh J5 .....4.925
Portsmouth,O. P12 ....4.925
Riverdale,Ill. A1 .....4.925
Sharon,Pa. S3 .....4.925
S.Chicago,Ill. W14 ....4.925
SparrowsPoint,Md. B2..4.925
Steubenville,O. W10 ...4.925
Warren,O. R2 .....4.925
Weirton,W.Va. W6 ...4.925
Youngstown U5, Y1 ..4.925

SHEETS, H.R., (19 Ga. & Lighter)

Niles,O. M21 .....6.05

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.10
Ind.Harbor,Ind. Y1 ....8.10
Irvin,Pa. U5 .....8.10
Munhall,Pa. U5 .....8.10
Newport,Ky. A2 .....8.10
Youngstown U5, Y1 ....8.10

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Cleveland J5, R2 ....7.275
Conshohocken,Pa. A3 ..7.325
Ecorse,Mich. G5 .....7.375
Fairfield,Ala. T2 .....7.275
Fairless,Pa. U5 .....7.325
Farrell,Pa. S3 .....7.275
Fontana,Calif. K1 .....8.175
Gary,Ind. U5 .....7.275
Ind.Harbor,Ind. I-2, Y1 7.275
Irvin,Pa. U5 .....7.275
Lackawanna (35) B2 ..7.275
Munhall,Pa. U5 .....7.275
Pittsburgh J5 .....7.275
S.Chicago,Ill. U5, W14 7.275
Sharon,Pa. S3 .....7.275
SparrowsPoint(36) B2..7.275
Warren,O. R2 .....7.275
Weirton,W.Va. W6 ....7.275
Youngstown U5, Y1 ..7.275

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ..5.175
Cleveland R2 .....5.675
Warren,O. R2 .....5.675

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....6.80
Middletown,O. A10 ....6.55
Warren,O. R2 .....6.80

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.05
Allenport,Pa. P7 .....6.05
Cleveland J5, R2 .....6.05
Conshohocken,Pa. A3 ..6.10
Detroit M1 .....6.05
Ecorse,Mich. G5 .....6.15
Fairfield,Ala. T2 .....6.05
Fairless,Pa. U5 .....6.10
Follansbee,W.Va. F4 ...6.05
Fontana, Calif. K1 ....7.30
Gary,Ind. U5 .....6.05
GraniteCity,Ill. G4 ....6.25
Ind.Harbor,Ind. I-2, Y1 6.05
Irvin,Pa. U5 .....6.05
Lackawanna,N.Y. B2 ..6.05
Mansfield,O. E6 .....6.05
Middletown,O. A10 ....6.05
Newport,Ky. A2 .....6.05
Pittsburg,Calif. C11 ..7.00
Pittsburgh J5 .....6.05
Portsmouth,O. P12 ....6.05
SparowsPoint,Md. B2 ..6.05
Steubenville,O. W10 ....6.05
Warren,O. R2 .....6.05
Weirton,W.Va. W6 ....6.05
Yorkville, O. W10 ....6.05
Youngstown Y1 .....6.05

SHEETS, Cold-Rolled High-Strength, Low-Alloy

Cleveland J5, R2 ....8.975
Ecorse, Mch. G5 .....9.075
Fairless,Pa. U5 .....9.025
Fontana,Calif. K1 ....10.275
Gary,Ind. U5 .....8.975
IndianaHarbor,Ind. Y1 8.975
Irvin,Pa. U5 .....8.975
Lackawanna (37) B2 ..8.975
Pittsburgh J5 .....8.975
SparrowsPoint (38) B2 8.975
Warren,O. R2 .....8.975
Weirton,W.Va. W6 ....8.975
Youngstown Y1 .....8.975

SHEETS, Culvert

	Cu Steel	Cu Fe
Ashland,Ky. A10	.6.95	7.20
Canton,O. R2	....6.95	7.45
Fairfield T2	....6.95	7.20
Gary,Ind. U5	....6.95	7.20
GraniteCity,Ill. G4	7.15	...
Ind.Harbor I-2	...6.95	7.20
Irvin,Pa. U5	.....6.95	7.20
Kokomo,Ind. C16	.7.05	...
MartinsFry. W10	.6.95	7.20
Pitts.,Calif. C11	..7.70	...
Pittsburgh J5	....6.95	...
SparrowsPt. B2	..6.95	...

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 .. 7.20

SHEETS, Galvanized Steel Hot-Dipped

Ala.City,Ala. R2 .....6.60‡
Ashland,Ky. A10 .....6.60†
Canton,O. R2 .....6.60‡
Dover,O. R1 .....6.60†
Fairfield,Ala. T2 .....6.60†
Gary,Ind. U5 .....6.00*
GraniteCity,Ill. G4 ....6.80*
Ind.Harbor,Ind. I-2 ...6.60†
Irvin,Pa. U5 .....6.60*
Kokomo,Ind. C16 .....6.70‡
MartinsFerry,O. W10 ..6.60*
Middletown,O. A10 ....6.60†
Pittsburg,Calif. C11 ...7.35*
Pittsburgh J5 .....6.60†
SparrowsPt.,Md. B2 ...6.60†
Warren,O. R2 .....6.60†
Weirton,W.Va. W6 ....6.60*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....9.725
SparrowsPt.(39) B2 ...9.725

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.00
Irvin,Pa. U5 .....7.00

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....6.85
Middletown,O. A10 ....6.85

SHEETS, Electrogalvanized

Cleveland (28) R2 ....7.425
Niles,O.(28) R2 .....7.425
Weirton,W.Va. W6 ...7.275

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) .9.25
Butler,Pa. A10 (type 2) .9.35

SHEETS, Enameling Iron

Ashland,Ky. A10 .....6.625
Cleveland R2 .....6.625
Gary,Ind. U5 .....6.625
GraniteCity,Ill. G4 ....6.825
Ind.Harbor,Ind. I-2,Y1 6.625
Irvin,Pa. U5 .....6.625
Middletown,O. A10 ....6.625
Niles,O. M21, S3 .....6.625
Youngstown Y1 .....6.625

BLUED STOCK, 29 Gage

Follansbee,W.Va. F4 ...8.65
Ind.Harbor,Ind. I-2 ...8.475
Yorkville,O. W10 .....8.475

SHEETS, Long Terne Steel (Commercial Quality)

BeechBottom,W.Va.W10 7.00
Gary,Ind. U5 .....7.00
Mansfield,O. E6 .....7.00
Middletown,O. A10 ....7.00
Niles,O. M21, S3 .....7.00
Warren,O. R2 .....7.00
Weirton,W.Va. W6 ....7.00

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 .....7.40

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div., Buffalo-Eclipse Corp.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C7 Cleve.Cold Rolling Mills
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Prod. Dept., Wickwire Spencer Steel Division
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.

D2 Detroit Steel Corp.
D3 Dearborn Division Sharon Steel Corp.
D4 Disston Division, H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 EasternGas&FuelAssoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins, E., Steel Tube
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md.Fine & Special. Wire
M17 Metal Forming Corp.
M18 Milton Steel Division, Merritt-Chapman&Scott
M21 Mallory-Sharon Titanium Corp.
M22 Mill Strip Products Co.

N1 National Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelson Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N14 Northwest.SteelRoll.Mill
N15 Northwestern S.&W. Co.
N19 Northeastern Steel Corp.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co. Sub. of Barium Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Meals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Work
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service
S41 Stainless Steel Div., J&L Steel Corp.
S42 Southern Elec. Steel Co.
T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Division, Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Div., H. K. Porter Co. Inc.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala City, Ala. (27) R2	4.925
Allenport, Pa. P7	4.925
Alton, Ill. L1	5.125
Ashland, Ky. (8) A10	4.925
Atlanta A11	5.125
Bessemer, Ala. T2	4.925
Birmingham C15	4.925
Buffalo (27) R2	4.925
Conshohocken, Pa. A3	4.975
Detroit M1	5.025
Ecorse, Mich. G5	5.025
Fairfield, Ala. T2	4.925
Fontana, Calif. K1	5.825
Gary, Ind. U5	4.925
Ind. Harbor, Ind. I-2, Y1	4.925
Johnstown, Pa. (25) B2	4.925
Lackaw'na, N.Y. (25) B2	4.925
LosAngeles (25) B3	5.675
Minnequa, Colo. C10	6.025
Pittsburg, Calif. C11	5.675
Riverdale, Ill. A1	4.925
SanFrancisco S7	6.35
Seattle (25) B3	6.35
Seattle N14	6.35
Sharon, Pa. S3	4.925
S.SanFrancisco (25) B3	5.675
SparrowsPoint, Md. B2	4.925
Sterling, Ill. (1) N15	4.925
Sterling, Ill. N15	5.025
Torrance, Calif. C11	5.675
Warren, O. R2	4.925
Weirton, W.Va. W6	4.925
Youngstown U5	4.925

STRIP, Hot-Rolled Alloy

Carnegie, Pa. S18	8.10
Farrell, Pa. S3	8.10
Gary, Ind. U5	8.10
Houston S5	8.35
Ind. Harbor, Ind. Y1	8.10
KansasCity, Mo. S5	8.35
LosAngeles B3	9.30
Lowellville, O. S3	8.10
Newport, Ky. A2	8.10
Sharon, Pa. S3	8.10
S.Chicago, Ill. W14	8.10
Youngstown U5, Y1	8.10

STRIP, Hot-Rolled High-Strength, Low-Alloy

Bessemer, Ala. T2	7.325
Conshohocken, Pa. A3	7.325
Ecorse, Mich. G5	7.425
Fairfield, Ala. T2	7.325
Farrell, Pa. S3	7.325
Gary, Ind. U5	7.325
Ind. Harbor, Ind. I-2, Y1	7.325
Lackawanna, N.Y. B2	7.325
LosAngeles (25) B3	8.075
Seattle (25) B3	8.325
Sharon, Pa. S3	7.325
S.Chicago, Ill. W14	7.325
S.SanFrancisco (25) B3	8.075
SparrowsPoint, Md. B2	7.325
Warren, O. R2	7.325
Weirton, W.Va. W6	7.325
Youngstown U5, Y1	7.325

STRIP, Hot-Rolled Ingot Iron

Ashland, Ky. (8) A10	5.175
Warren, O. R2	5.675

STRIP, Cold-Rolled Carbon

Anderson, Ind. G6	7.15
Baltimore T6	7.15
Boston T6	**7.70**
Buffalo S40	7.15
Cleveland A7, J5	7.15
Conshohocken, Pa. A3	7.20
Dearborn, Mich. D3	7.25
Detroit D2, M1, P20	7.25
Dover, O. G6	7.15
Ecorse, Mich. G5	7.25
Evanston, Ill. M22	7.25
Follansbee, W.Va. F4	7.15
Fontana, Calif. K1	9.00
FranklinPark, Ill. T6	7.25
Ind. Harbor, Ind. Y1	7.15
Indianapolis J5	7.30
LosAngeles J5	9.05
LosAngeles C1	9.20
NewBedford, Mass. R10	7.60
NewBritain (10) S15	7.15
NewCastle, Pa. B4, E5	7.15
NewHaven, Conn. D2	7.60
NewKensington, Pa. A6	7.15
Pawtucket, R.I. R3	7.80
Pawtucket, R.I. N8	7.70
Philadelphia (45) P24	7.70
Pittsburgh J5	7.15
Riverdale, Ill. A1	7.25
Rome, N.Y. (32) R6	7.15
Sharon, Pa. S3	7.15
Trenton, N.J. (31) R5	8.60
Wallingford, Conn. W2	7.60
Warren, O. R2, T5	7.15
Weirton, W.Va. W6	7.15
Worcester, Mass. A7	7.70
Youngstown J5, Y1	7.15

STRIP, Cold-Rolled Alloy

Boston T6	15.40
Carnegie, Pa. S18	15.05
Cleveland A7	*15.05*
Dover, O. G6	15.05
Farrell, Pa. S3	15.05
FranklinPark, Ill. T6	15.05
Harrison, N.J. C18	15.05
Indianapolis J5	15.20
Lowellville, O. S3	15.05
Pawtucket, R.I. N8	15.40
Riverdale, Ill. A1	**15.05**
Sharon, Pa. S3	15.05
Worcester, Mass. A7	*15.35*
Youngstown J5	15.05

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.45
Dearborn, Mich. D3	10.60
Dover, O. G6	10.45
Ecorse, Mich. G5	10.55
Farrell, Pa. S3	10.50
Ind. Harbor, Ind. Y1	10.65
Sharon, Pa. S3	10.50
Warren, O. R2	10.45
Weirton, W.Va. W6	10.50
Youngstown Y1	10.65

STRIP, Cold-Rolled Ingot Iron

Warren, O. R2	7.90

STRIP, C.R. Electrogalvanized

Cleveland A7	7.15*
Dover, O. G6	7.15*
Evanston, Ill. M22	7.25*
Riverdale, Ill. A1	7.25*
Warren, O. B9, T5	7.15*
Worcester, Mass. A7	7.70*
Youngstown J5	7.15*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Sharon, Pa. S3	7.275

TIGHT COOPERAGE HOOP

Atlanta A11	5.65
Riverdale, Ill. A1	5.50
Sharon, Pa. S3	5.35
Youngstown U5	5.35

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. W1	...	10.70	12.90	16.10	19.30
Carnegie, Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn, Mich. D3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover, O. G6	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. M22	8.95	10.40	12.60	....	....
Fostoria, O. S1	10.05	11.15	13.10	16.10	....
FranklinPark, Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison N.J. C18	...	....	12.90	16.10	19.30
Indianapolis J5	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles J5	11.15	12.60	14.80	....	....
NewBritain, Conn. (10) S15	8.95	10.40	12.60	15.60	18.55
NewCastle, Pa. B4, E5	8.95	10.40	12.60	15.60	....
NewHaven, Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington, Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	...	10.70	12.90	16.10	19.30
Pawtucket, R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome, N.Y. (32) R6	8.95	10 40	12.60	15.60	18.55
Sharon, Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton, N.J. R5	...	10.70	12.90	16.10	19.30
Wallingford, Conn. W2	9.40	10.70	12.90	15.90	18.75
Warren, O. T5	8.95	10.40	12.60	15.60	18.55
Worcester, Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown J5	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol, Conn. W1	18.10	21.95	26.30
Buffalo W12	18.10	....	....
Fostoria, O. S1	18.30	22.15	....
FranklinPark, Ill. T6	18.45	22.30	26.65
Harrison, N.J. C18	18.10	21.95	26.30
NewYork W3	18.10	21.95	26.30
Palmer, Mass. W12	18.10	....	....
Trenton, N.J. R5	18.10	21.95	26.30
Worcester, Mass. A7, T6	18.10	21.95	26.30
Youngstown J5	18.45	22.30	26.65

SILICON STEEL

H.R. SHEETS (22 Ga., cut lengths)	Field	Armature	Electric	Motor	Dynamo
BeechBottom, W.Va. W10	....	....	11.80	12.90	13.95
Mansfield, O. E6	9.625	11.10	11.80	12.90	13.95
Newport, Ky. A2	9.625	11.10	11.80	12.90	13.95
Niles, O. M21, S3	9.625	11.10	11.80	12.90	....
Vandergrift, Pa. U5	....	11.10	11.80	12.90	13.95
Warren, O. R2	9.625	11.10	11.80	12.90	....
Zanesville, O. A10	....	11.10	11.80	12.90	13.95
Zanesville, O. A10 (SP Coils)	....	....	11.55	12.65	13.70

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom, W.Va. W10.	....	11.35	12.05	13.15	14.20
Brackenridge, Pa. A4	....	....	12.05	13.15	14.20
GraniteCity, Ill. G4	....	9.825*11.05*	11.75*	12.85*	....
IndianaHarbor, Ind. I-2	..	9.625†10.85*	11.55*	12.65*	....
Mansfield, O. E6	....	9.625*11.35	12.05	13.50	14.20
Vandergrift, Pa. U5	....	9.625*11.35	12.05	13.15	14.20
Warren, O. R2	....	9.625*11.35	12.05	13.15	14.20
Zanesville, O. A10 (FP coils)	...	11.35	12.05	13.15	14.20

H.R. SHEETS (22Ga., cut lengths)	Transformer Grades T-72	T-65	T-58	T-52
BeechBotton, W.Va. W10	15.00	15.55	16.05	17.10
Vandergrift, Pa. U5	14.75	15.55	16.05	17.10
Zanesville, O. A10	15.00	15.55	16.05	17.10

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge, Pa. A4.	....	17.60	19.20	19.70	20.20	....
Butler, Pa. A10	....	....	19.20	19.70	20.20	....
Vandergrift, Pa. U5	.. 16.60	17.60	19.20	19.70	20.20	15.25**
Warren, O. R2	....	....	....	....	....	15.25‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed, semiprocessed ½c lower. **Cut lengths, ¾-cent lower.

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa, Pa. J5	$8.75	$9.00	$9.40
Fairfield, Ala T2	8.85	9.10	9.50
Fairless, Pa. U5	8.85	9.10	9.50
Fontana, Calif. K1	9.50	9.75	10.15
Gary, Ind. U5	8.75	9.00	9.40
GraniteCity, Ill. G4	8.85	9.10	9.50
IndianaHarbor, Ind. I-2, Y1	8.75	9.00	9.40
Irvin, Pa. U5	8.75	9.00	9.40
Niles, O. R2	8.75	9.00	9.40
Pittsburg, Calif. C11	9.50	9.75	10.15
SparrowsPoint, Md. B2	8.85	9.10	9.50
Weirton, W.Va. W6	8.75	9.00	9.40
Yorkville, O. W10	8.75	9.00	9.40

ELECTROTIN (22-27 Gage; Dollars per 100 lb)			
Aliquippa, Pa. J5	7.725	7.925	....
Niles, O. R2	7.725	7.925	8.125

TINPLATE, American	1.25 lb	1.50 lb
Aliquippa, Pa. J5	$10.05	$10.30
Fairfield, Ala. T2	10.15	10.40
Fairless, Pa. U5	10.15	10.40
Fontana, Calif. K1	10.80	11.05
Gary, Ind. U5	10.05	10.30
Irvin, Pa. U5	10.05	10.30
Pitts., Calif. C11.	10.80	11.05
Sp. Pt., Md. B2	10.15	10.40
Weirton, W.Va. W6	10.05	10.30
Yorkville, O. W10	10.05	10.30

BLACK PLATE (Base Box)	
Aliquippa, Pa. J5	$7.85
Fairfield, Ala. T2	7.95
Fairless, Pa. U5	7.95
Fontana, Calif. K1	8.60
Gary, Ind. U5	7.85
GraniteCity, Ill. G4	7.95
Ind. Harbor, Ind. I-2, Y1	7.85
Irvin, Pa. U5	7.85
Niles, O. R2	7.85
Pittsburg, Calif. C11	8.60
SparrowsPoint, Md. B2	7.95
Weirton, W.Va. W6	7.85
Yorkville, O. W10	7.85

HOLLOWARE ENAMELING Black Plate (29 Gage)

Aliquippa, Pa. J5	$7.50
Gary, Ind. U5	7.50
GraniteCity, Ill. G4	7.60
Ind. Harbor, Ind. Y1	7.50
Irvin, Pa. U5	7.50
Yorkville, O. W10	7.50

MANUFACTURING TERNES (Special Coated, Base Box)

Gary, Ind. U5	$9.70
Irvin, Pa. U5	9.70

ROOFING SHORT TERNES (8 lb Coated, Base Box)

Gary, Ind. U5	$11.25

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity, Ala. R2	7.65
Aliquippa, Pa. J5	7.65
Alton, Ill. L1	7.85
Atlanta A11	**7.85**
Bartonville, Ill. K4	7.75
Buffalo W12	7.65
Chicago W13	7.65
Cleveland A7, C20	7.65
Crawfordsville, Ind. M8	7.75
Donora, Pa. A7	7.65
Duluth A7	7.65
Fairfield, Ala. T2	7.65
Fostoria, O. (24) S1	7.75
Houston S5	7.90
Jacksonville, Fla. M8	8.00
Johnstown, Pa. B2	7.65
Joliet, Ill. A7	7.65
KansasCity, Mo. S5	7.90
Kokomo, Ind. C16	7.75
LosAngeles B3	8.60
Minnequa, Colo. C10	7.90
Monessen, Pa. P7, P16	7.65
N. Tonawanda, N.Y. B11	7.65
Palmer, Mass. W12	7.95
Pittsburg, Calif. C11	8.60
Portsmouth, O. P12	7.65
Rankin, Pa. A7	7.65
S.Chicago, Ill. R2	7.65
S.SanFrancisco C10	8.60
SparrowsPoint, Md. B2	7.75
Sterling, Ill. (1) N15	7.65
Sterling, Ill. N15	7.75
Struthers, O. Y1	7.65
Waukegan, Ill. A7	7.65
Worcester, Mass. A7	7.95

WIRE, Gal'd ACSR for Cores

Bartonville, Ill. K4	12.65
Buffalo W12	12.65
Cleveland A7	**12.65**
Donora, Pa. A7	12.65
Duluth A7	12.65
Johnstown, Pa. B2	12.65
Minnequa, Colo. C10	12.775
Monessen, Pa. P16	12.65
Muncie, Ind. I-7	12.85
NewHaven, Conn. A7	12.95
Palmer, Mass. W12	12.95
Pittsburg, Calif. C11	13.45
Portsmouth, O. P12	**12.65**
Roebling, N.J. R5	12.95
SparrowsPt., Md. B2	12.75
Struthers, O. Y1	12.65
Trenton, N.J. A7	12.95
Waukegan, Ill. A7	12.65
Worcester, Mass. A7	12.95

WIRE, Upholstery Spring

Aliquippa, Pa. J5	9.30
Alton, Ill. L1	9.50
Buffalo W12	9.30
Cleveland A7	9.30
Donora, Pa. A7	9.30
Duluth A7	9.30
Johnstown, Pa. B2	9.30
KansasCity, Mo. S5	9.55
LosAngeles B3	10.25
Minnequa, Colo. C10	9.50
Monessen, Pa. P7, P16	9.30
NewHaven, Conn. A7	9.60
Palmer, Mass. W12	9.60
Pittsburg, Calif. C11	10.25
Portsmouth, O. P12	9.30
Roebling, N.J. R5	9.60
S.Chicago, Ill. R2	9.30
S.SanFrancisco C10	10.25
SparrowsPt., Md. B2	9.40
Struthers, O. Y1	9.30
Trenton, N.J. A7	9.60
Waukegan, Ill. A7	9.30
Worcester, Mass. A7	9.60

WIRE, MB Spring, High Carbon

Aliquippa, Pa. J5	9.30
Alton, Ill. L1	9.50
Bartonville, Ill. K4	9.40
Buffalo W12	9.30
Cleveland A7	9.30
Donora, Pa. A7	9.30
Duluth A7	9.30
Fostoria, O. S1	9.35
Johnstown, Pa. B2	9.30
KansasCity, Mo. S5	9.55
LosAngeles B3	10.25
Milbury, Mass. (12) N6	9.60
Minnequa, Colo. C10	**9.50**
Monessen, Pa. P7, P16	9.30
Muncie, Ind. I-7	9.50
Palmer, Mass. (12) W12	9.60
Pittsburg, Calif. C11	10.25
Portsmouth, O. P12	9.30
Roebling, N.J. R5	9.60
S.Chicago, Ill. R2	9.30
S.SanFrancisco C10	10.25
SparrowsPt., Md. B2	9.40
Struthers, O. Y1	9.30
Trenton, N.J. A7	9.60
Waukegan, Ill. A7	9.30
Worcester, A7, J4, T6	9.60

WIRE, Fine & Weaving (8" Coils)

Alton, Ill. L1	15.80
Bartonville, Ill. K4	15.70
Buffalo W12	15.60
Chicago W13	15.60
Cleveland A7	15.60
Crawfordsville, Ind. M8	15.70
Fostoria, O. S1	15.60
Houston S5	15.85
Jacksonville, Fla. M8	15.95
Johnstown, Pa. B2	15.60
KansasCity, Mo. S5	15.85
Kokomo, Ind. C16	15.60
Minnequa, Colo. C10	15.85
Monessen, Pa. P7, P16	15.60
Muncie, Ind. I-7	15.80
Palmer, Mass. W12	15.90
S.SanFrancisco C10	16.45
Waukegan, Ill. A7	15.60
Worcester, Mass. A7, T6	15.90

ROPE WIRE

Bartonville, Ill. K4	12.75
Buffalo W12	12.75
Fostoria, O. S1	12.75
Johnstown, Pa. B2	12.75
Monessen, Pa. P7	12.75
Muncie, Ind. I-7	12.95
Palmer, Mass. W12	13.05
Portsmouth, O. P12	12.75
Roebling, N.J. R5	13.05
SparrowsPt., Md. B2	12.85
Struthers, O. Y1	12.75
Worcester, Mass. J4	13.05

(A) Plow and Mild Plow; add 0.25c for Improved Plow

WIRE, Tire Bead

Bartonville,Ill. K4	16.55
Monessen,Pa. P16	16.55
Roebling,N.J. R5	17.05

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	11.65
Baltimore T6	11.95
Boston T6	11.95
Buffalo W12	11.65
Chicago W13	11.75
Cleveland A7	11.65
Crawfordsville,Ind. M8	11.65
Dover,O. G6	11.65
Fostoria,O. S1	11.95
FranklinPark,Ill. T6	11.75
Kokomo,Ind. C16	11.65
Massillon,O. R8	11.65
Milwaukee C23	11.85
Monessen,Pa. P7, P16	11.65
Palmer,Mass. W12	11.95
Pawtucket,R.I. N8	11.95
Philadelphia P24	11.95
Riverdale,Ill. A1	11.75
Rome,N.Y. R6	11.65
Sharon,Pa. S3	11.65
Trenton,N.J. R5	11.95
Warren,O. B9	11.65
Worcester,Mass. A7, T6	11.95

NAILS, Stock	**Col.**
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	175
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston,Tex. S5	178
Jacksonville,Fla.(20) M8	184
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers; per cwt)

Galveston,Tex. D7	$8.95

NAILS, Cut (100 lb keg)
To Dealers (33)

Conshohocken,Pa. A3	$9.80
Wheeling,W.Va. W10	9.80

POLISHED STAPLES	**Col.**
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	175
Atlanta A11	177
Bartonville,Ill. K4	177
Crawfordsville,Ind. M8	177
Donora,Pa. A7	175
Duluth A7	175
Fairfield,Ala. T2	175
Jacksonville,Fla.(20) M8	186
Johnstown,Pa. B2	175
Joliet,Ill. A7	175
Kokomo,Ind. C16	177
Minnequa,Colo. C10	180
Pittsburg,Calif. C11	194
Rankin,Pa. A7	175
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	181

TIE WIRE, Automatic Baler (14½ Ga.)(Per 97 lb Net Box)
Coil No. 3150

AlabamaCity,Ala. R2	$10.26
Atlanta A11	10.36
Bartonville,Ill. K4	10.36
Buffalo W12	9.82
Chicago W13	10.26
Crawfordsville,Ind. M8	10.36
Donora,Pa. A7	10.26
Duluth A7	10.26
Fairfield,Ala. T2	10.26
Houston S5	10.51
Jacksonville,Fla. M8	10.82
Johnstown,Pa. B2	10.26
Joliet,Ill. A7	10.26
KansasCity,Mo. S5	10 51
Kokomo,Ind. C16	10.36
LosAngeles B3	11.05
Minnequa,Colo. C10	10.51
Pittsburg,Calif. C11	11.04
SparrowsPt.,Md. B2	10.36
Sterling,Ill(37) N15	10.36

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$10.60
Atlanta A11	10.70
Bartonville,Ill. K4	10.70
Buffalo W12	10.15
Chicago W13	10.60
Crawfordsville,Ind. M8	10.70
Donora,Pa. A7	10.60
Duluth A7	10.60
Fairfield,Ala. T2	10.60
Houston S5	10.85
Jacksonville,Fla. M8	11.16
Johnstown,Pa. B2	10.60
Joliet,Ill. A7	10.60
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	10.70
LosAngeles B3	11.40
Minnequa,Colo. C10	10.85
Pittsburg,Calif. C11	11.40
S.Chicago,Ill. R2	10.60
S.SanFrancisco C10	11.40
SparrowsPt.,Md. B2	10.70
Sterling,Ill.(37) N15	10.70

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$10.65
Atlanta A11	10.75
Bartonville,Ill. K4	10.75
Buffalo W12	10.20
Chicago W13	10.65
Crawfordsville,Ind. M8	10.75
Donora,Pa. A7	10.65
Duluth A7	10.65
Fairfield,Ala. T2	10.65
Houston S5	10.90
Jacksonville,Fla. M8	11.21
Johnstown,Pa. B2	10.65
Joliet,Ill. A7	10.65
KansasCity,Mo. S5	10.90
Kokomo,Ind. C16	10.75
LosAngeles B3	11.45
Minnequa,Colo. C10	10.90
Pittsburg,Calif. C11	11.45
S.Chicago,Ill. R2	10.65
S.SanFrancisco C10	11.45
SparrowsPt.,Md. B2	10.75
Sterling,Ill.(37) N15	10.75

BALE TIES, Single Loop	**Col.**
AlabamaCity,Ala. R2	212
Atlanta A11	214
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	219
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
Pittsburg,Calif. C11	236
S.SanFrancisco C10	236
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214
Williamsport,Pa. S19	175

FENCE POSTS

Birmingham C15	171
ChicagoHts.,Ill. C2, I-2	172
Duluth A7	172
Franklin,Pa. F5	172
Huntington,W.Va. C15	171
Johnstown,Pa. B2	172
Marion,O. P11	172
Minnequa,Colo. C10	177
Sterling,Ill.(1) N15	172
Tonawanda,N.Y. B12	174

WIRE, Barbed	**Col.**
AlabamaCity,Ala. R2	193**
Aliquippa, Pa. J5	190§
Atlanta A11	198*
Bartonville,Ill. K4	198
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston,Tex. S5	198**
Jacksonville,Fla. M8	203
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196*
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
S.SanFrancisco C10	213**
SparrowsPoint.Md. B2	198§
Sterling,Ill.(7) N15	198§

WOVEN FENCE, 9-15 Ga.	**Col.**
Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-14½ga.J5	190§
Atlanta A11	192*
Bartonville,Ill. K4	192
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston,Tex. S5	192**
Jacksonville,Fla. M8	197
Johnstown,Pa.(43) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A7	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192§

WIRE (16 gage)	**An'ld Galv. Stone**	**Stone**
Ala.City,Ala.R2	17.15	18.70**
Aliq'ppa,Pa. J5	17.15	18.95
Bartonville K4	17.25	19.05
Cleveland A7	17.15	....
Crawf'dsville M8	17.25	19.05
Fostoria,O. S1	17.65	19.20†
Houston S5	17.40	18.95**
Jacksonville M8	17.50	19.30
Johnstown B2	17.15	18.95§
Kan.City,Mo. S5	17.40	....
Kokomo C16	17.25	18.80†
Minnequa C10	17.40	18.95**
P'lm'r,Mass. W12	17.45	19.00†
Pitts.,Calif. C11	17.50	19.05†
SparrowsPt. B2	17.25	19.05§
Sterling(37) N15	17.25	19.05§
Waukegan A7	17.15	18.70†
Worcester A7	17.45	....

WIRE, Merchant Quality

(6 to 8 gage)	**An'ld Galv.**
Ala.City,Ala. R2	8.65 9.20**
Aliquippa J5	8.65 9.325§
Atlanta(48) A11	8.75 9.425*
Bartonville(48) K4	8.75 9.425
Buffalo W12	8.65 9.20†
Cleveland A7	8.65 ....
Crawfordsville M8	8.75 9.425
Donora,Pa. A7	8.65 9.20†
Duluth A7	8.65 9.20†
Fairfield T2	8.65 9.20†
Houston(48) S5	8.90 9.45**
Jacks'ville,Fla. M8	9.00 9.675
Johnstown B2(48)	8.65 9.325§
Joliet,Ill. A7	8.65 9.20†
Kans.City(48) S5	8.90 9.45**
Kokomo C16	8.75 9.30†
LosAngeles B3	9.60 10.275§
Minnequa C10	8.90 9.45**
Monessen P7(48)	8.65 9.25*
Palmer,Mass. W12	8.95 9.50†
Pitts.,Calif. C11	9.60 10.15†
Rankin,Pa. A7	8.65 9.20†
S.Chicago R2	8.65 9.20**
S.SanFran. C10	9.60 10.15**
Spar'wsPt.B2(48)	8.75 9.425§
Sterling(48) N15	8.90 9.575§
Sterling(1)(48)	8.80 9.475§
Struth'rs,O.(48)Y1	8.65 9.30†
Worcester,Mass.A7	8.95 9.50†

Based on zinc price of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. **Subject to zinc equalization extras.

FASTENERS

(Base discounts, full container quantity, per cent off list, f.o.b. mill)

BOLTS

Carriage, Machine Bolts
Full Size Body (cut thread)
½ in. and smaller:
6 in. and shorter.... 49.0
Longer than 6 in. .. 39.0
⅝ in. thru 1 in.:
6 in. and shorter.... 39.0
Longer than 6 in. .. 35.0
1⅛ in. and larger:
All lengths 35.0
Undersized Body (rolled thread)
½ in. and smaller:
6 in. and shorter... 49.0
Carriage,Machine, Lag Bolts Hot Galvanized:
½ in. and smaller:
6 in. and shorter... 29.0
Longer than 6 in. .. 15.0
⅝ in. and larger:
All lengths 12.0
Lag Bolts (all diam.)
6 in. and shorter... 49.0
Longer than 6 in. .. 39.0
Plow and Tap Bolts
½ in. and smaller by 6 in. and shorter 49.0
Larger than ½ in. or longer than 6 in. .. 39.0
Blank Bolts 39.0
Step, Elevator, Tire Bolts 49.0
Stove Bolts, Slotted:
⅛ to ¼-in. incl.,
3 in. and shorter.. 55.0
over ⅛ to ½ in., inclusive 55.0

NUTS

Reg. & Heavy Square Nuts:
All sizes 55.5
Square Nuts, Reg. & Heavy, Hot Galvanized:
All sizes 41.0
Hex Nuts, Reg. & Heavy, Hot Pressed:
¾ in. and smaller.. 60.5
⅞ in. to 1 in., incl. 55.5
1⅛ in. to 1½ in., incl. 58.5
1⅝ in. and larger.. 53.5
Hex Nuts, Reg. & Heavy, Cold Punched:
¾ in. and smaller.. 60.5
⅞ in. to 1½ in., incl. 55.5
1⅝ in. and larger.. 53.5
Hex Nuts, All Types, Hot Galvanized:
¾ in. and smaller.. 46.5
⅞ in. to 1 in., incl.. 41.5
1⅛ in. to 1½ in., incl. 46.5
Hex Nuts, Semifinished, Heavy (Incl. Slotted):
¾ in. and smaller.. 60.5
⅞ in. to 1½ in., incl. 55.5
1⅝ in. and larger.. 53.5
Hex Nuts, Finished (Incl. Slotted and Castellated):
1 in. and smaller.. 63.0
1⅛ in. to 1½ in., incl. 59.0
1⅝ in. and larger.. 53.5
Semifinished Hex Nuts, Reg. (Incl. Slotted):
⅝ in. and smaller.. 60.5
¾ in. to 1 in., incl. 63.0
1⅛ in. to 1½ in., incl. 59.0
1⅝ in. and larger.. 53.5

CAP AND SETSCREWS

(Base discounts, packages, per cent off list, f.o.b. mill)
Hex Head Capscrews, Coarse or Fine Thread, Bright:
6 in. and shorter:
⅝ in. and smaller.. 40.0
¾, ⅞, and 1 in. diam. 22.0
Longer than 6 in.:
⅝ in. and smaller.. 8.0
¾, ⅞, and 1 in. diam. ..... +6.0
High Carbon, Heat Treated:
6 in. and shorter:
⅝ in. and smaller.. 26.0
¾, ⅞, and 1 in. diam. 3.0
Longer than 6 in.:
⅝ in. and smaller..+13.0
¾, ⅞, and 1 in. diam. .....+32.0
Flat Head Capscrews:
¾ in. and smaller..+76.0
Setscrews, Square Head, Cup Point, Coarse Thread:
Through 1 in. diam.:
6 in. and shorter... Net
Longer than 6 in...+23

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.
Structural ½ in., larger 12.25
$\frac{7}{16}$ in. under: List less 19%

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	25.98	23.54
1¼	13	....	30.78	23.36
1½	13	29.03	34.01	25.83
1¾	13	34.29	40.18	30.51
2	13	38.44	45.05	34.20
2¼	13	43.29	50.75	38.52
2¼	12	46.99	55.06	41.81
2½	12	51.76	60.65	46.05
2¾	12	56.04	65.67	49.88
3	12	59.76	70.03	53.19

RAILWAY MATERIALS

	Standard No. 1	Standard No. 2	Tee Rails All No. 2	Tee Rails 60 lb Under
RAILS				
Bessemer,Pa. U5	5.525	5.425	....	6.50
Ensley,Ala. T2	5.525	5.425	....	6.50
Fairfield,Ala. T2	....	....	....	6.50
Gary,Ind. U5	5.525	5.425	....	...
Huntington,W.Va. C15	....	....	....	6.50
IndianaHarbor,Ind. I-2	5.525	5.425	5.475	...
Johnstown,Pa. B2	....	....	...(16)	6.50
Lackawanna,N.Y. B2	5.525	5.425	....	6.50
Minnequa,Colo. C10	5.525	5.425	....	7.00
Steelton,Pa. B2	5.525	5.425	....	...
Williamsport,Pa. S19	....	....	....	6.50

TIE PLATES

Fairfield,Ala. T2	6.60
Gary,Ind. U5	6.60
Ind.Harbor,Ind. I-2	6.60
Lackawanna,N.Y. B2	6.60
Minnequa,Colo. C10	6.60
Seattle B3	6.75
Steelton,Pa. B2	6.60
Torrance,Calif. C11	6.75

JOINT BARS

Bessemer,Pa. U5	6.975
Fairfield,Ala. T2	6.975
Ind.Harbor,Ind. I-2	6.975
Joliet,Ill. U5	6.975
Lackawanna,N.Y. B2	6.975
Minnequa,Colo. C10	6.975
Steelton,Pa. B2	6.975

AXLES

Ind.Harbor,Ind. S13	8.775
Johnstown,Pa. B2	8.775

TRACK BOLTS, Untreated

Cleveland R2	14.75
KansasCity,Mo. S5	14.75
Lebanon,Pa. B2	14.75
Minnequa,Colo. C10	14.75
Pittsburgh P14	14.75
Seattle B3	15.25

SCREW SPIKES

Lebanon,Pa. B2	14.50

STANDARD TRACK SPIKES

Fairfield,Ala. T2	9.75
Ind.Harbor,Ind. I-2, Y1	9.75
KansasCity,Mo. S5	9.75
Lebanon,Pa. B2	9.75
Minnequa,Colo. C10	9.75
Pittsburgh J5	9.75
Seattle B3	10.25
S.Chicago,Ill. R2	9.75
Struthers,O. Y1	9.75
Youngstown R2	9.75

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Chicago or Birm. base.
(7) Chicago base 2 cols. lower.
(8) 13 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5 80c.
(15) ¾" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) Plus 1c per 100 lb.
(21) New Haven, Conn. base.
(22) Deld. San Francisco Bay area.
(23) Special quality.
(24) Deduct 0.15c, finer than 15 Ga.
(25) Bar mill bands.
(26) Delivered in mill zone, 6.045c.
(27) Bar mill sizes.
(28) Boardmill.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.60c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 14 Ga. & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9 10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.685c.
(43) 9-14½ Ga.
(44) To fabricators.
(45) 0.022 in. and lighter, over 0 022", 8 20c.
(46) Special quality.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds; 8.65c, over 3½ in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25
Ambridge, Pa. N2	+9.25	....	+2.75	....	+0.25	....	1.25	....	1.25	....	1	....	3.5	....
Lorain, O. N3	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25
Youngstown Y1	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25

ELECTRIC STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Alton, Ill. L1	....	....	....	....	....	....	3.25	+12	6.25	+8	9.75	+3.5	12.25	+2.75
Benwood, W. Va. W10	4.5	+22	+7.5	+31	+18	+39.5	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Butler, Pa. F6	5.5	+21	+6.5	+30	+17	+38.5	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Fairless, Pa. N3	....	....	....	....	....	....	3.25	+12	6.25	+8	9.75	+3.5	12.25	+2.75
Fontana, Calif. K1	....	....	....	....	....	....	+8.25	+23.5	+5.25	+19.5	+1.75	+15	0.75	+14.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	4.25	+11	7.25	+7	10.75	+2.5	13.25	+3.25
Lorain, O. N3	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Sharon, Pa. S4	5.5	+21	+6.5	+30	+17	+38.5	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Sparrows Pt., Md. B2	3.5	+23	8.5	+32	+19	+40.5	3.25	+12	6.25	+8	9.75	+3.5	12.25	+2.75
Wheatland, Pa. W9	5.5	+21	+6	+30	+17	+38.5	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Youngstown R2, Y1	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.73		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	....	....	....	....
Alton, Ill. L1	12.75	+1.75	13.25	+1.25	14.75	+1.5	14.75	+1.5	....	....	....	....
Benwood, W. Va. W10	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5
Etna, Pa. N2	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5
Fairless, Pa. N3	12.75	+1.75	13.25	+1.25	14.75	+1.5	14.75	+1.5	4.25	+12.5	4.25	+12.5
Fontana, Calif. K1	1.25	+13.25	1.75	+12.75	3.25	+13	3.25	+13	+7.25	+24	+7.25	+24
Indiana Harbor, Ind. Y1	13.75	+0.75	14.25	+0.25	15.75	+0.5	15.25	+0.5	5.25	+11.5	5.25	+11.5
Lorain, O. N3	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	....	....	....	....
Sharon, Pa. M6	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	....	....	....	....
Sparrows Pt., Md. B2	12.75	+1.75	13.25	+1.25	14.75	+1.5	14.75	+1.5	4.25	+12.5	4.25	+12.5
Wheatland, Pa. W9	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5
Youngstown R2, Y1	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5

*Galvanized pipe discounts based on current price of zinc (10.00c, East St. Louis).

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	Wire Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.00	27.00	....	36.00	....	42.00	44.25	48.50	45.00
202	23.75	30.25	36.50	39.00	40.75	43.00	45.00	49.25	49.25
301	23.25	28.00	37.25	37.25	42.00	44.25	46.25	51.25	47.50
302	25.25	31.50	38.00	40.50	42.75	45.00	47.25	52.00	52.00
302B	25.50	32.75	40.75	45.75	45.00	47.25	49.50	57.00	57.00
303	....	32.00	41.00	....	45.50	48.00	50.00	56.75	56.75
304	27.00	33.25	40.50	44.25	45.25	47.75	50.75	55.50	55.50
304L	....	....	48.25	51.50	53.00	55.50	58.50	63.25	63.25
305	28.50	36.75	42.50	47.50	45.25	47.75	51.25	58.75	58.75
308	30.75	38.25	47.25	50.25	52.75	55.75	60.25	63.00	63.00
309	39.75	49.50	57.75	64.50	63.75	67.00	71.00	80.50	80.50
310	49.75	61.50	78.00	84.25	86.50	91.00	92.75	96.75	96.75
314	....	....	....	....	86.50	....	92.75	....	104.50
316	39.75	49.50	62.25	69.25	69.25	73.00	76.75	81.50	81.50
316L	....	....	70.00	76.50	77.00	80.75	84.50	89.25	89.25
317	48.00	60.00	76.75	88.25	86.25	90.75	93.50	101.00	101.00
321	32.25	40.00	47.00	53.50	52.50	55.50	59.75	65.50	65.50
330	....	....	118.75	....	132.00	138.50	105.50	108.00	149.25
18-8 CbTa	37.00	46.50	55.75	63.50	61.50	64.75	69.75	79.25	79.25
403	....	....	32.00	....	35.75	37.75	40.25	48.25	48.25
405	19.50	25.50	29.75	36.00	33.50	35.25	37.50	46.75	46.75
410	16.75	21.50	28.25	31.00	32.00	33.75	35.00	40.25	40.25
416	....	....	28.75	....	32.50	34.25	36.25	48.25	48.25
420	....	33.50	34.25	41.75	39.25	41.25	45.25	62.00	62.00
430	17.00	21.75	28.75	32.00	32.50	34.25	36.00	40.75	40.75
430F	....	....	29.50	....	33.00	34.75	36.75	51.75	51.75
431	....	28.75	37.75	....	42.00	44.25	46.00	56.00	56.00
446	....	....	39.25	59.00	44.25	46.50	47.75	70.00	70.00

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; Alloy Metal Wire Div., H. K. Porter Co. Inc.; Alloy Tube Div., Carpenter Steel Co.; American Steel & Wire Div., U. S. Steel Corp.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; G. O. Carlson Inc.; Charter Wire Products Co.; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Elwood Ivins Steel Tube Works Inc.; Firth Sterling Inc.; Ft. Wayne Metals Inc.; Globe Steel Tubes Co.; Helical Tube Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Jones & Laughlin Steel Corp.; Joslyn Mfg. & Supply Co.; Kenmore Metals Corp.; Maryland Fine & Specialty Wire Co.; McInnes Steel Co.; McLouth Steel Corp.; Metal Forming Corp.; National-Standard Co.; National Tube Div., U. S. Steel Corp.; Newman-Crosby Steel Co.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Rodney Metals Inc.; Rome Mfg. Co.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Spencer Wire Corp.; Stainless Welded Products Inc.; Standard Tube Co.; Stainless Steel Div., Jones & Laughlin Steel Corp.; Superior Steel Corp.; Superior Tube Co.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co.; Tube Methods Inc.; Ulbrich Stainless Steels; United States Steel Corp.; Universal-Cyclops Steel Co.; Wallingford Steel Co.; Washington Steel Corp.

Clad Steel

Stainless	Plates—Carbon Base 5%	10%	15%	20%	Sheets Carbon Base 20%
302	....	....	....	....	37.50
304	34.70	37.95	42.25	46.70	40.00
304L	36.90	40.55	45.10	49.85	....
316	40.35	44.40	49.50	54.50	58.75
316L	45.05	49.35	54.70	60.10	....
316 Cb	47.30	53.80	61.45	69.10	....
321	36.60	40.05	44.60	49.30	47.25
347	38.25	42.40	47.55	52.80	57.00
405	28.60	29.85	33.35	36.85	....
410	28.15	29.55	33.10	36.70	....
430	28.30	29.80	33.55	37.25	....
Inconel	48.90	59.55	70.15	80.85	....
Nickel	41.65	51.95	62.30	72.70	....
Nickel, Low Carbon	41.95	52.60	63.30	74.15	....
Monel	43.35	53.55	63.80	74.05	....
Copper*	....	....	....	....	46.00

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	33.95	40.25

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.305	Cr Hot Work	0.510
Extra Carbon	0.360	W-Cr Hot Work	0.500
Special Carbon	0.475	V-Cr Hot Work	0.475
Oil Hardening	0.475	Hi-Carbon-Cr	0.830

Grade by Analysis (%)

W	Cr	V	Co	Mo		$ per lb
20.25	4.25	1.6	12.25	...	.....	4.285
18.25	4.25	1	4.75	...	.....	2.500
18	4	2	9	...	.....	2.870
18	4	2	....	...	.....	1.960
18	4	1	....	...	.....	1.795
9	3.5	..	....	...	.....	1.395
13.5	4	3	....	...	.....	2.060
13.75	3.75	2	5	...	.....	2.440
6.4	4.5	1.9	....	5	.....	1.300
6	4	3	....	6	.....	1.545
1.5	4	1	....	8.5	.....	1.155

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal transportation tax.

	Basic	No. 2 Foundry	Malleable	Bessemer
Birmingham District				
AlabamaCity,Ala. R2	62.00	62.50	....	....
Birmingham R2	62.00	62.50‡	....	....
Birmingham U6	....	62.50‡	66.50	....
Woodward,Ala. W15	62.00**	62.50‡	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N.Tonawanda,N.Y. T9	....	66.50	67.00	67.50
Tonawanda,N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester,N.Y., deld.	69.02	69.52	70.02	....
Syracuse,N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S.Chicago,Ill. R2	66.00	....	66.50	....
S.Chicago,Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.62	69.12	69.12	69.62
Muskegon,Mich., deld.	....	74.12	74.12	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron,O., deld.	69.12	69.62	69.62	70.12
Mid-Atlantic District				
Birdsboro,Pa. B10	68.00	68.50	69.00	69.50
Chester,Pa. P4	66.50	67.00	67.50	....
Swedeland,Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.10	75.60	....
Newark,N.J., deld.	72.29	72.79	73.29	73.79
Philadelphia, deld.	70.01	70.51	71.01	71.59
Troy,N.Y. R2	68.00	68.50	69.00	69.50
Pittsburgh District				
NevilleIsland,Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	67.95	67.95	68.48
McKeesRocks,Pa., deld.	....	67.60	67.60	68.13
Lawrenceville, Homestead, Wilmerding,Monaca,Pa., deld.	....	68.26	68.26	68.79
Verona,Trafford,Pa., deld.	68.29	68.82	68.82	69.35
Brackenridge,Pa., deld.	68.60	69.10	69.10	69.63
Midland,Pa. C18	66.00	....	....	....

	Basic	No. 2 Foundry	Malleable	Bessemer
Youngstown District				
Hubbard, O. Y1	....	....	66.50	....
Sharpsville,Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	67.00
Mansfield,O., deld.	70.90	....	71.40	71.90
Duluth I-3	66.00	66.50	66.50	67.00
Erie,Pa. I-3	66.00	66.50	66.50	67.00
Everett,Mass. E1	67.50	68.00	68.50	....
Fontana,Calif. K1	75.00	75.50	....	....
Geneva,Utah C11	66.00	66.50	....	....
GraniteCity,Ill. G4	67.90	68.40	68.90	....
Ironton,Utah C11	66.00	66.50	....	....
Minnequa,Colo. C10	68.00	68.50	69.00	....
Rockwood,Tenn. T3	....	62.50‡	66.50	....
Toledo,O. I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.54	73.04	....	....

**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
‡Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1 for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson,O. I-3, J1	78.00
Buffalo H1	78.50

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

CalvertCity,Ky. P15	$99.00
NiagaraFalls,N.Y. P15	99.00
Keokuk,Iowa Open-hearth & Fdry, $9 freight allowed K2	103.50
Keokuk,Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, max fr'gt allowed up to $9, K2	106.50

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles,Tenn. T3 (Phos. 0.035% max)	$78.50
Troy,N.Y. R2 (Phos. 0.035% max)	74.00
Philadelphia, deld.	82.27
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie,Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
NevilleIsland,Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00

Warehouse Steel Products

Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 15 cents per 100 lb except: Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, Spokane, San Francisco, 10 cents; Atlanta, Chattanooga, Houston, Seattle no change.

	SHEETS				STRIP	BARS			Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Gal. 10 Ga.†	Stainless Type 302	Hot-Rolled*	H.R. Rounds	C.F. Rds.‡	H.R. Alloy 4140††[5]		Carbon	Floor
Atlanta	8.59§	9.86§	....	....	8.64	9.01	10.68	....	9.05	8.97	10.90
Baltimore	8.28	8.88	9.76	....	8.76	9.06	11.34#	15.18	9.19	8.66	10.14
Birmingham	8.18	9.45	11.07	....	8.23	8.60	10.57	....	8.64	8.56	10.70
Boston	9.38	10.44	11.45	....	9.42	9.73	12.90#	15.28	9.63	9.72	11.20
Buffalo	8.40	9.00	10.07	....	8.50	8.80	10.90#	15.00	8.90	8.90	10.45
Chattanooga	8.35	9.69	9.65	....	8.40	8.77	10.46	....	8.88	8.80	10.66
Chicago	8.20	9.45	10.00	....	8.23	8.60	8.80	14.65	8.64	8.56	9.88
Cincinnati	8.34	9.48	10.05	....	8.54	8.92	9.31	14.96	9.18	8.93	10.21
Cleveland	8.18	9.45	9.95	....	8.33	8.69	10.80#	14.74	9.01	8.79	10.11
Denver	9.38	11.75	....	....	9.41	9.78	11.10	....	9.82	9.74	11.06
Detroit	8.43	9.70	10.35	....	8.58	8.90	9.15	14.91	9.18	8.91	10.13
Erie, Pa.	8.20	9.45	9.95[10]	....	8.50	8.75	9.05[10]	....	9.00	8.85	10.10
Houston	8.45	9.75	8.45	....	8.60	9.05	11.10	....	9.10	9.05	10.30
Jackson, Miss.	8.52	9.79	....	....	8.57	8.94	10.68	....	8.97	8.90	10.74
Los Angeles	9.50	10.75	11.65	....	9.55	9.55	12.75	16.00	9.60	9.55	11.70
Milwaukee	8.33	9.58	10.13	....	8.36	8.73	9.03	14.78	8.85	8.69	10.01
Moline, Ill.	8.55	9.80	10.35	....	8.58	8.95	9.15	....	8.99	8.91	....
New York	8.87	10.13	10.56	....	9.31	9.57	12.76#	15.09	9.35	9.43	10.71
Norfolk, Va.	8.05	....	....	....	8.55	8.60	10.80	....	8.95	8.45	9.95
Philadelphia	8.00	8.90	9.87	51.94	8.69	8.65	11.51#	15.01	8.50	8.77	9.77**
Pittsburgh	8.18	9.45	10.35	50.00	8.33	8.60	10.80#	14.65	8.64	8.56	9.88
Portland, Oreg.	8.50	11.20	11.55	57.20	11.35‡‡	8.65	14.65#	15.95	9.60	8.30	12.50
Richmond, Va.	8.45	....	10.40	....	9.15	9.15	....	....	9.40	8.85	10.35
St. Louis	8.54	9.79	10.36	....	8.59	8.97	9.41	15.01	9.10	8.93	10.25
St. Paul	8.79	10.04	10.61	....	8.84	9.36	9.66	....	9.38	9.30	10.49
San Francisco	9.35	10.75	11.00	54.85	9.45	9.70	13.00	16.00	9.50	9.60	12.00
Seattle	9.95	11.15	12.00	57.20	10.00	10.80	14.05	16.35	9.80	9.70	12.10
Spokane, Wash.	9.95	11.15	12.00	....	10.00	10.10	14.05	17.20	9.80	9.70	12.10
Washington	8.48	9.58	....	....	9.06	9.15	9.73	....	9.35	8.86	10.36

*Prices do not include gage extras; †prices include gage and coating extras; ‡includes 35-cent bar quality extras; §42 in. and under; **⅛ in. and heavier; ††as annealed; ‡‡over 4 in.; §§over 3 in.; #1 in. round C-1018.

Base quantities, 2000 to 4999 lb except as noted; cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb, and in Los Angeles, 6000 lb and over; stainless sheets, 8000 lb except in Chicago, New York, Boston, Seattle, Portland, Oreg. 10,000 lb and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb, except in Portland, Oreg., 1000 to 9999 lb; [3]—400 to 9999 lb; [5]—1000 to 1999 lb; [8]—2000 to 3999 lb; [10]—2000 lb and over.

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., $135; Salina, Pa., $140; Niles, O., $138; Cutler, Utah, $165.

Super-Duty: Ironton, O., Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Pa., New Savage, Md., St., Louis, $175; Stevens Pottery, Ga., $185; Cutler, Utah, $233.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, O., Hawstone, Pa., $150; Warren, Niles, Windham, O., Hays, Latrobe, Morrisville, Pa., $155; E. Chicago, Ind., Joliet, Rockdale, Ill., $160; Lehigh, Utah, $175; Los Angeles, $180.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, O., Leslie, Md., Athens, Tex., $157; Morrisville, Hays, Latrobe, Pa., $160; E. Chicago, Ind., $167; Curtner, Calif., $182.

Silica Brick (per 1000)

Clearfield, Pa., $140; Philadelphia, $137; Woodbridge, N. J., $135.

Ladle Brick (per 1000)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, O., $96.75; Clearfield, Pa., Portsmouth, O., $102.

High-Alumina Brick (per 1000)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $235; Danville, Ill., $238; Philadelphia, Clearfield, Pa., $230; Orviston, Pa., $245.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $295; Danville, Ill., $298; Philadelphia, Clearfield, Orviston, Pa., $305.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $335; Danville, Ill., $338; Philadelphia, Clearfield, Orviston, Pa., $345.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $188.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned, bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, O., $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.

Magnesite (per net ton)

Domestic, dead-burned, bulk ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅜ in. grains with fines: Baltimore, $73.

Fluorspar

Metallurgical grades, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-41; 70%, $36.40; 60%, $33-36.50. Imported, net tons, f.o.b. cars point of entry duty paid, metallurgical grade: European, $33-34; Mexican, all-rail, duty paid, $25.25-25.75; barge, Brownsville, Tex., $27.25-27.75.

Metal Powder

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge Iron, Swedish: Deld. east of Mississippi River, ocean bags 23,000 lb and over..	10.50
F.o.b. Riverton or Camden, N. J., west of Mississippi River.	9.50
Sponge Iron, Domestic, 98 + % Fe: Deld. east of Mississippi River, 23,000 lb and over	10.50
F.o.b. Riverton, N. J., west of Mississippi River	9.50
Electrolytic Iron: Melting stock, 99.9% Fe, irregular fragments of ⅛ in. x 1.3 in.	28.00
Annealed, 99.5% Fe..	36.50
Unannealed (99 + % Fe)	36.00
Unannealed (99 + % Fe) (minus 325 mesh)	59.00
Powder Flakes (minus 16, plus 100 mesh)..	29.00
Carbonyl Iron: 98.1-99.9%, 3 to 20 microns, depending on grade, 93.00-290.00 in standard 200-lb containers; all minus 200 mesh.	

	Cents
Aluminum: Atomized, 500 lb drum, frght allowed	
Carlots	39.50
Ton lots	41.50
Antimony, 500 lb lots	42.00*
Brass, 5000-lb lots	31.30-38.40†
Bronze, 5000-lb lots	48.10-52.70†
Copper: Electrolytic	14.25*
Reduced	14.25*
Lead	7.50*
Manganese: Minus 35 mesh	64.00
Minus 100 mesh	70.00
Minus 200 mesh	75.00
Nickel unannealed ...	$1.15
Nickel-Silver, 5000-lb lots	49.20-61.30†
Phosphor-Copper, 5000-lb lots	59.80
Copper (atomized) 5000-lb lots	40.30-48.80‡
Silicon	47.50
Solder	7.00*
Stainless Steel, 304 ...	$1.02
Stainless Steel, 316 ...	$1.20
Tin	14.50*
Zinc, 5000-lb lots	17.50-30.70‡
Tungsten:	Dollars
Melting grade, 99% 60 to 2000 mesh: 1000 lb and over...	3.15
Less than 1000 lb ..	3.30
Chromium, electrolytic 99.8% Cr min metallic basis	5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Diam (Inches)	Length (Inches)	Per 100 lb
2	24	$60.75
2½	30	39.25
3	40	37.00
4	40	35.00
5⅛	40	34.75
6	60	31.50
7	60	28.25
8, 9, 10	60	28.00
12	72	26.75
14	60	26.75
16	72	25.75
17	60	26.25
18	72	26.25
20	72	25.25
24	84	26.00

CARBON

8	60	13.30
10	60	13.00
12	60	12.95
14	60	12.85
14	72	11.95
17	60	11.85
17	72	11.40
20	84	11.40
20	90	11.00
24	72, 84	11.25
24	96	10.95
30	84	11.05
40, 35	110	10.70
40	100	10.70

Imported Steel

(Base per 100 lb, landed, duty paid, based on current ocean rates. Any increase in these rates is for buyer's account. Source of shipment: Western continental European countries)

	North Atlantic	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305...	$6.30	$6.25	$6.25	$6.50
Bar Size Angles	6.62	6.57	6.57	6.75
Structural Angles	6.62	6.57	6.57	6.75
I-Beams	6.87	6.82	6.82	7.00
Channels	6.87	6.82	6.82	7.00
Plates (basic bessemer)	8.35	8.30	8.30	8.60
Sheets, H.R.	8.25	8.20	8.20	8.50
Sheets, C.R. (drawing quality)	9.00	8.95	8.95	9.25
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	26.79	26.67	26.67	27.36
Barbed Wire (†)	6.95	6.95	6.95	7.40
Merchant Bars	6.87	6.82	6.82	7.22
Hot-Rolled Bands	7.20	7.15	7.15	7.55
Wire Rods, Thomas Commercial No. 5	6.73	6.73	6.73	7.13
Wire Rods, O.H. Cold Heading Quality No. 5	7.07	7.07	7.07	7.47
Bright Common Wire Nails (§)	8.38	8.38	8.38	8.58

†Per 82 lb, net, reel. §Per 100-lb kegs, 20d nails and heavier.

Ores

Lake Superior Iron Ore

(Prices effective for the 1957 shipping season, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Mesabi nonbessemer	11.45
Old range bessemer	11.85
Old range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 30, 1957, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

New Jersey, foundry and basic 62-64% concentrates	25.00-27.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 65%	27.00-27.50
N. African hematite (spot)	nom.
Brazilian iron ore, 68-69%	30.00

Tungsten Ore

Net ton, unit, before duty

Foreign wolframite, good commercial quality	13.75-14.25
Domestic, concentrates mine	55.00

Manganese Ore

Mn 46-48%, Indian (export tax included), $1.35-$1.45 per long ton unit, c.i.f. U. S. ports, duty for buyer's account: other than Indian, $1.35-$1.45; contracts by negotiation.

Chrome Ore

Gross ton f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$55.00-58.00
48% 2.8:1	52.00-55.00
48% no ratio	46.00-48.00

South African Transvaal

48% no ratio	$40.00-41.00
44% no ratio	30.00-31.00

Turkish

48% 3:1	$59.00-62.00

Domestic

Rail nearest seller

18% 3:1	$39.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked	$1.18

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$2.90-3.30
60-65%	3.30-3.60

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace.....	$14.75-15.75
Connellsville, Pa., foundry.....	18.00-18.50

Oven Foundry Coke

Birmingham, ovens	$28.85
Cincinnati, deld.	31.84
Buffalo, ovens	30.50
Camden, N. J., ovens	29.50
Detroit, ovens	30.50
Pontiac, Mich., deld.	32.25
Saginaw, Mich., deld.	33.83
Erie, Pa., ovens	30.50
Everett, Mass., ovens New England, deld.	31.55*
Indianapolis, ovens	29.75
Ironton, O., ovens	29.00
Cincinnati, deld.	31.84
Kearny, N. J., ovens	29.75
Milwaukee, ovens	30.50
Painesville, O., ovens	30.50
Cleveland, deld.	32.69
Philadelphia, ovens	29.50
St. Louis, ovens	31.50
Neville Island (Pittsburgh), Pa., ovens.	29.25
St. Paul, ovens	29.75
Chicago, deld.	33.24
Swedeland, Pa., ovens	29.50
Terre Haute, Ind. ovens	29.75

*Or within $4.85 freight zone from works.

Coal Chemicals

Spot, cents per gallon, ovens

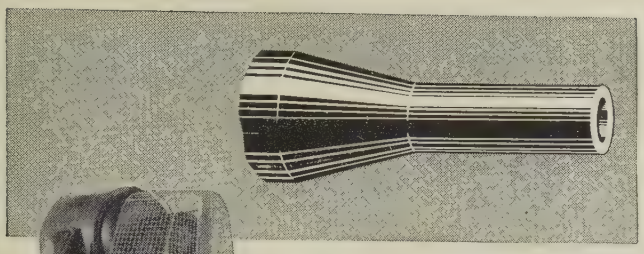
Pure benzene	36.00
Toluene, one deg.	29.50
Industrial xylene	32.00-34.00

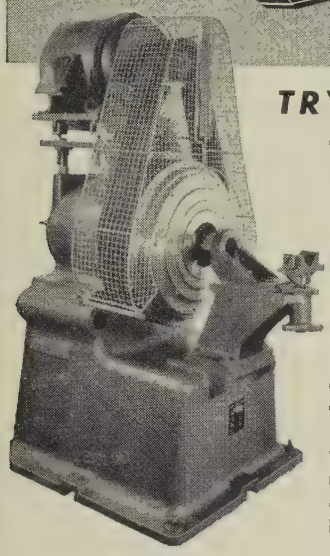
Per ton, bulk, ovens

Ammonium sulfate	$32.00

Cents per pound, producing point

Phenol: Grade 1, 15.00; Grade 2-3, 14.50; Grade 4, 16.50; Grade 5, 15.25.





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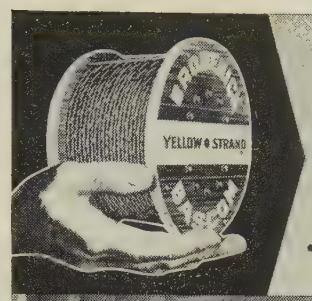

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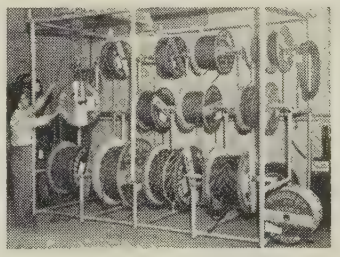

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Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, per gross ton, Palmerton, Pa. 21-23% Mn, $105; 19-21% Mn, 1-3% Si, $102.50; 16-19% Mn, $100.50.

Standard Ferromanganese: (Mn 74-76%, C 7% approx). Base price per net ton; $245, Johnstown, Duquesne, Sheridan, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74% respectively.

(Mn 79-81%). Lump $263 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-90%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max 0.03% C, 3.5c for max 0.50% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 25.5c per lb of contained Mn, packed, carload 26.8c, ton lot 28.4c, less ton 29.6c. Delivered. Spot, add 0.25c.

Manganese Metal: 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2%). Carload, lump, bulk, 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lot 49.25c. Delivered. Spot, add 2c.

Electrolytic Manganese Metal: Min carload, 34c; 2000 lb to min carload, 36c; 500 lb to 1999 lb, 38c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk 1.50% C grade, 18-20% Si, 12.8c per lb of alloy. Packed, c.l. 14c, ton 14.45c, less ton 15.45c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $200 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%). Contract $225 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l. lump, bulk 28.75c per lb of contained Cr; c.l. packed 30.30c, ton lot 32.05c; less ton 33.45c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-71%). Contract, carload, lump, bulk, C 0.025% max (Simplex) 36.75c per lb contained Cr, 0.02% max 41.00c, 0.03% max 39.75c, 0.06% max 38.50c, 0.1% max 38.50c, 0.15% max 37.50c, 0.2c max 38.25c, 0.5% max 38.00c, 1.0% max 37.75c, 1.5c max 37.50c, 2.0% max 37.40c. Ton lot, add 3.4c, less ton add 5.1c. Carload packed add 1.75c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). Contract, c.l., 2 in. x D, bulk 30.05c per lb of contained Cr. Packed, c.l. 31.65c, ton 33.45c, less ton 34.95c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed, 8M x D, 21.25c, per lb of alloy, ton lot 22.50c; less ton lot 23.70c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome-Silicon: (Cr 39-41%, Si 42-49%, C 0.05% max). Contract, carload, lump, 3" x down and 2" x down, bulk, 41.70c per lb of contained Cr; 1" x down, bulk, 42.85c. Delivered.

Chromium Metal Electrolytic: Commercial grade (Cr 99.8% min, metallic basis, Fe 0.2% max). Contract, carlot, packed 2" x D plate (about ⅛" thick) $1.29 per lb, ton lot $1.31, less ton lot $1.33. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55%, or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1 $1.05 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract less carload lot, packed $1.38 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.0c per lb of contained Si. Packed 21.40c; ton lot 22.50c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 14.20c per lb of contained Si. Packed c.l. 16.70c, ton lot 18.15c, less ton 19.80c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Contract, carload, lump, bulk, 15.25c per lb contained silicon. Packed, c.l. 17.25c, ton lot 19.05c; less ton 20.4c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 16.4c per lb of contained Si. Packed, c.l. 18.30c, ton lot 19.95c, less ton 21.2c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Contract, carload, lump, bulk, 19.5c per lb of contained Si. Packed, c.l. 21.15c, ton lot 22.55c, less ton 23.6c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 0.75% max Fe, 0.07% max Ca). C.l. lump, bulk, 22.00c per lb of Si. Packed, c.l. 23.65c, ton lot 24.95c, less ton 25.95c. Add 0.5c for max 0.03% Ca grade. Deduct 0.5c for max 1% Fe grade analyzing min 99.75% Si; 0.75c for max 1.25% Fe grades analyzing min 96.75% Si. Spot, add 0.25c.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 10.65c per lb of alloy; ton lot, packed, 11.8c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l. lump, bulk 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 27.25c per lb of alloy, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices, 100 lb and over, are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Bortam: (B 1.5-1.9%). Ton lot, 45c per lb; less than ton lot, 50c per lb.

Carbortam: (1 to 2%). Contract, lump, carload 9.50c per lb f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Contract, carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3⅝ lb each and containing 2 lb of Cr). Contract, carload, bulk 19.60c per lb of briquet, carload packed in box pallets 19.80c, in bags 20.70c; 3000 lb to c.l. in box pallets 21.00c; 2000 lb to c.l. in bags, 21.90c; less than 2000 lb in bags 22.80c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Contract, carload, bulk 14.8c per lb of briquet; c.l., packed, pallets 15c, bags 16c; 3000 lb to c.l., pallets 16.2c; 2000 lb to c.l. bags, 17.2c; less ton 18.1c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weigbing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). Contract, c.l. bulk 15.1c per lb of briquet; c.l. packed, pallets, 15.3c; bags 16.3c, 3000 lb to c.l., pallets, 16.5c; 2000 lb to c.l., bags 17.5c; less ton 18.4c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si). Contract, carload, bulk 7.7c per lb of briquet; packed, pallets, 7.9c; bags 8.9c; 3000 lb to c.l., pallets 9.5c; 2000 lb to c.l. bags 10.5c; less ton 11.4c. Delivered. Spot, add 0.25c. (Small size—weighing approx 2½ lb and containing 1 lb of Si). Carload, bulk 7.85c. Packed, pallets 8.05c; bags 9.05c; 3000 lb to c.l. pallets 9.65c; 2000 lb to c.l. bags 10.65c; less ton 11.55c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.41 per pound of Mo contained, f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $2.95 per lb of contained W; 2000 lb W to 5000 lb W, $3.05; less than 2000 lb W, $3.17. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 8% max, C 0.4% max). Contract, ton lot 2" x D, $4.90 per lb of contained Cb. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx Ta 20% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lot 2" x D, $4.25 per lb of contained Cb plus Ta, delivered; less ton lot $4.30.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5.7%, Fe 20% approx). Contract, c.l. packed ½-in. x 12 M 20.00c per lb of alloy, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 5: (Si 48-52%, Ca 5.7%, Ti 9-11%). C.l. packed, 19c per lb of alloy, ton lot 20.15c; less ton lot 21.4c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.1c per lb of alloy; ton lot 19.55c; less ton lot 20.8c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Simanal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk 18.50c. Packed c.l. 19.50c, 2000 lb to c.l. 20.50c, less than 2000 lb 21c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $4 for each 1% of P above or below the base); carload, f.o.b. sellers' works. Mt. Pleasant, Siglo, Tenn., $110 per gross ton.

Ferromolybdenum: (55-75%). Per lb of contained Mo, in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.68 in all sizes except powdered which is $1.74.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans, $1.39; in bags, $1.38, f.o.b. Langeloth and Washington, Pa.

Scrap Prices Are Still Tumbling

STEEL's composite on the prime open hearth grade declines another $2.67; at $39.50, it is at its lowest point since July, 1955. Substantial mill buying is absent

Scrap Prices, Page 202

Pittsburgh—A heavy tonnage of scrap is piling up in this district. Mills will not have to pay more than $41 for No. 1 heavy melting. That's $2 below the last price paid by a mill on the fringe of this area.

Railroad scrap grades dropped sharply on recent lists. No. 1 railroad heavy melting is quoted at $44, off $11 from a previous quotation. Demand for other grades is light.

Philadelphia — New buying of major steel grades of scrap at prices $2.50 a ton lower brings No. 1 heavy melting to $38.50, No. 2 heavy melting to $34.50, and No. 2 bundles to $29.25. Heavy breakable cast has sold at $43, off $3 to $4 a ton. Other steelmaking grades are lower, although some prices are nominal.

New business in short shoveling turnings and machine shop turnings has been done at $26 and $23. No. 1 heavy melting in the Baltimore & Ohio Railroad list brought $41.35, Pittsburgh, on the road's own line.

Export buying is slowing down. Three boats have finished loading at this port. Two more are due in the next few weeks.

New York—Heavy melting steel scrap prices are soft. No. 1 grades are off $1 a ton. No. 2 are down $2. Brokers' buying prices for borings and turnings are also easier within the range of $13-$16, shipping point. Heavy breakable cast is quoted lower. New buying by domestic mills is light, and export activity is on the decline. Less scrap is coming into yards at the lower prices.

Boston—Steel scrap prices continue to decline, notably on borings and turnings. Brokers are paying the lowest prices in recent years for turnings ($12, shipping point, is tops for short shovel turnings). No. 2 bundles are off $1. The largest New England user of No. 1 heavy melting steel has posted $37, brokers' price for October, but it is not buying much tonnage.

Chicago—Scrap prices continue their downward slide. Broker offering and buying prices, which are off $4 to $5 a ton on open hearth grades, and $2 to $3 on railroad grades, are the chief market guides. In some cases, prices are lows for this year, and there is no indication that the bottom has been reached. Lack of improvement in the steelmaking rate, locally and nationally, is tending to extend market weakness.

Cleveland—Scrap prices continue to drop here, quotations largely being nominal in the absence of representative buying. The steelmaking grades are off another $2 a ton, No. 1 being quoted $36-$37 here, and $38-$39 in the valley, on the basis of brokers' views.

Stocks are accumulating in dealers' yards, and the outlook is for continued rise in inventories, with mills well supplied and ingot operations holding.

Youngstown — Resumption of mill buying is not in sight. All principal buyers are out of the market, and material is piling up in dealers' yards. No. 1 heavy melting, which sold at $65-$66 early this year, is nominally $38-$39.

Cincinnati—The market is soft, with steelmaking grades off another $2 a ton. Brokers' buying price for No. 1 heavy melting is $36-$37. Brokers say dealers are reluctant to sell at today's prices, feeling that the price break went too far, too fast.

Detroit — Foundry scrap prices have slipped, catching up with the drop in the No. 1 grades here. Local foundries indicate increased use of ductile iron calls for pig iron instead of scrap for charging.

Only a few scrap buys were reported here last week. Dealers and brokers feel the market is closer to bottom; prices possibly may continue to drop until the water rate goes off.

Buffalo—Scrap is down $6 to $9 a ton here, following purchases by a leading consumer. The mill paid $35.50 for No. 2 heavy melting and $32.50 for No. 2 bundles, off $6 a ton from September prices.

The No. 1 grades show even greater weakness, being down $9, with No. 1 heavy melting and No. 1 bundles quoted at $38-$39. Sharp price cuts also were made in blast furnace grades, low phos, railroad specialties, and other items.

The general market undertone

(*Please turn to Page* 207)

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL, Oct. 9, 1957. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Oct. 9	$39.50
Oct. 2	42.17
Sept. Avg.	47.73
Oct. 1956	57.27
Oct. 1952	43.00

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	*40.00-41.00*
No. 2 heavy melting	*35.00-36.00*
No. 1 factory bundles	45.00-46.00
No. 1 dealer bundles	*40.00-41.00*
No. 2 bundles	*32.00-33.00*
No. 1 busheling	*40.00-41.00*
Machine shop turnings	21.00-22.00
Mixed borings, turnings	21.00-22.00
Short shovel turnings	24.00-25.00
Cast iron borings	24.00-25.00
Cut structurals:	
2 ft. and under	*45.00-46.00*
3 ft lengths	*44.00-45.00*
Heavy turnings	*36.00-37.00*
Punchings & plate scrap	*44.00-45.00*
Electric furnace bundles	*44.00-45.00*

Cast Iron Grades

No. 1 cupola	44.00-45.00
Stove plate	38.00-39.00
Unstripped motor blocks	31.00-32.00
Clean auto cast	47.00-48.00
Drop broken machinery	56.00-57.00

Railroad Scrap

No. 1 R.R. heavy melt	*43.00-44.00*
Rails, 2 ft and under	*68.00-69.00*
Rails, 18 in. and under	*69.00-70.00*
Angles, splice bars	*58.00-59.00*
Rails, rerolling	*68.00-69.00*

Stainless Steel Scrap

18-8 bundles & solids	225.00-235.00
18-8 turnings	125.00-135.00
430 bundles & solids	80.00-85.00
430 turnings	55.00-60.00

CLEVELAND

No. 1 heavy melting	*36.00-37.00*
No. 2 heavy melting	*29.00-30.00*
No. 1 factory bundles	39.00-40.00
No. 1 bundles	*36.00-37.00*
No. 2 bundles	*25.00-26.00*
No. 1 busheling	*36.00-37.00*
Machine shop turnings	*14.00-15.00*
Short shovel turnings	*18.00-19.00*
Mixed borings, turnings	*18.00-19.00*
Cast iron borings	*18.00-19.00*
Cut foundry steel	*38.00-39.00*
Cut structurals, plates 2 ft and under	*43.00-44.00*
Low phos. punchings & plate	*37.00-38.00*
Alloy free, short shovel turnings	24.00-25.00
Electric furnace bundles	*37.00-38.00*

Cast Iron Grades

No. 1 cupola	*44.00-45.00*
Charging box cast	*36.00-37.00*
Heavy breakable cast	*34.00-35.00*
Stove plate	*42.00-43.00*
Unstripped motor blocks	*29.00-30.00*
Brake shoes	*33.00-34.00*
Clean auto cast	*44.00--45.00*
Burnt cast	*31.00-32.00*
Drop broken machinery	*48.00-49.00*

Railroad Scrap

No. 1 R.R. heavy melt	*39.00-40.00*
R.R. malleable	55.00-56.00
Rails, 2 ft and under	*62.00-63.00*
Rails, 18 in. and under	*63.00-64.00*
Rails, random lengths	*57.00-58.00*
Cast steel	*54.00-55.00*
Railroad specialties	*54.00-55.00*
Uncut tires	*49.00-50.00*
Angles, splice bars	*54.00-55.00*
Rails, rerolling	*62.00-63.00*

Stainless Steel
(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	215.00-220.00
18-8 turnings	115.00-120.00
430 clips, bundles, solids	75.00-80.00
430 turnings	40.00-50.00

YOUNGSTOWN

No. 1 heavy melting	*38.00-39.00*
No. 2 heavy melting	*33.00-34.00*
No. 1 bundles	*38.00-39.00*
No. 2 bundles	*29.00-30.00*
No. 1 busheling	*38.00-39.00*
Machine shop turnings	*15.00-16.00*
Short shovel turnings	*19.00-20.00*
Cast iron borings	*19.00-20.00*
Low phos.	*41.00-42.00*
Electric furnace bundles	*41.00-42.00*

Railroad Scrap

No. 1 R.R. heavy melt	*41.00-42.00*

CHICAGO

No. 1 heavy melt., indus.	*41.00-42.00*
No. 1 hvy melt., dealer	*37.00-38.00*
No. 2 heavy melting	*35.00-36.00*
No. 1 factory bundles	*42.00-43.00*
No. 1 dealer bundles	*36.00-37.00*
No. 2 bundles	*25.00-26.00*
No. 1 busheling, indus.	*41.00-42.00*
No. 1 busheling dealer	*37.00-38.00*
Machine shop turnings	*20.00-21.00*
Mixed borings, turnings	*22.00-23.00*
Short shovel turnings	*22.00-23.00*
Cast iron borings	*22.00-23.00*
Cut structurals, 3 ft.	*44.00-45.00*
Punchings & plate scrap	*45.00-46.00*

Cast Iron Grades

No. 1 cupola	*38.00-39.00*
Stove plate	*36.00-37.00*
Unstripped motor blocks	*30.00-31.00*
Clean auto cast	*43.00-44.00*
Drop broken machinery	*43.00-44.00*

Railroad Scrap

No. 1 R.R. heavy melt	*44.00-45.00*
R.R. malleable	*51.00-52.00*
Rails, 2 ft and under	*56.00-57.00*
Rails, 18 in. and under	*57.00-58.00*
Angles, splice bars	*52.00-53.00*
Axles	*57.00-58.00*
Rails, rerolling	*57.00-58.00*

Stainless Steel Scrap

18-8 bundles & solids	215.00-225.00
18-8 turnings	115.00-125.00
430 bundles & solids	80.00-90.00
430 turnings	50.00-55.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	26.00-27.00
No. 1 bundles	31.00-32.00
No. 2 bundles	24.00-25.00
No. 1 busheling	30.00-31.00
Machine shop turnings	*14.00-15.00*
Mixed borings, turnings	*15.00-16.00*
Short shovel turnings	*16.00-17.00*
Punchings & plate scrap	*32.00*

Cast Iron Grades

No. 1 cupola	*37.00*
Stove plate	*32.00*
Charging box cast	*31.00*
Heavy breakable	*31.00*
Unstripped motor blocks	*18.00*
Clean auto cast	*38.00*
Malleable	*39.00†*

†Nominal

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	43.00
No. 2 heavy melting	41.00
No. 1 bundles	43.00
No. 2 bundles	35.00
No. 1 busheling	43.00
Machine shop turnings	23.00
Short shovel turnings	25.00

Cast Iron Grades

No. 1 cupola	45.00
Charging box cast	40.00
Heavy breakable cast	40.00
Unstripped motor blocks	40.00
Brake shoes	40.00
Clean auto cast	46.00
Stove plate	*41.00*

Railroad Scrap

No. 1 R.R. heavy melt	*42.00*
Rails, 18 in. and under	*64.00*
Rails, random lengths	*56.00*
Rails, rerolling	*62.00*
Angles, splice bars	*53.00*

PHILADELPHIA

No. 1 heavy melting	*38.50*
No. 2 heavy melting	*34.50*
No. 1 bundles	*34.50*
No. 2 bundles	*29.25*
No. 1 busheling	*39.50*
Electric furnace bundles	*45.00*
Mixed borings, turnings	*24.00*
Short shovel turnings	*26.00*
Machine shop turnings	*23.00*
Heavy turnings	*35.00*
Structurals & plate	*46.00-48.00*
Couplers, springs, wheels	*58.00*
Rails crops, 2 ft & under	*68.00-69.00*

Cast Iron Grades

No. 1 cupola	43.00
Heavy breakable cast	*43.00*
Malleable	*59.00*
Drop broken machinery	*52.00-53.00*

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	*39.00-40.00*
No. 2 heavy melting	*34.00-35.00*
No. 1 bundles	*39.00-40.00*
No. 2 bundles	*26.00-27.00*
Machine shop turnings	*13.00-14.00*
Mixed borings, turnings	*14.00-15.00*
Short shovel turnings	*15.00-16.00*
Low phos. (structurals & plate)	*46.00-47.00*

Cast Iron Grades

No. 1 cupola	39.00-40.00
Unstripped motor blocks	35.00-36.00
Heavy breakable	*35.00-36.00†*

Stainless Steel

18-8, sheets, clips, solids	*180.00-190.00*
18-8 borings, turnings	*80.00-90.00*
430 sheets, clips, solids	*55.00-60.00*
410 sheets, clips, solids	50.00-55.00

†Nominal

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	35.00-36.00
No. 2 heavy melting	31.00-32.00
No. 1 bundles	35.00-36.00
No. 2 bundles	*28.00-29.00*
No. 1 busheling	*33.00-34.00*
Machine shop turnings	*10.00-11.00*
Mixed borings, turnings	*11.00-12.00*
Short shovel turnings	*12.00-13.00*
No. 1 cast	33.00-34.00
Mixed cupola cast	32.00-33.00
No. 1 machinery cast	38.00-39.00

BUFFALO

No. 1 heavy melting	*38.00-39.00*
No. 2 heavy melting	34.50-35.50
No. 1 bundles	*38.00-39.00*
No. 2 bundles	31.50-32.50
No. 1 busheling	*38.00-39.00*
Mixed borings, turnings	*23.00-24.00*
Machine shop turnings	*21.00-22.00*
Short shovel turnings	*24.00-25.00*
Cast iron borings	*23.00-24.00*
Low phos.	*43.00-44.00*

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	*43.00-44.00*
No. 1 machinery	*47.00-48.00*

Railroad Scrap

Rails, random lengths	*54.00-55.00*
Rails, 3 ft and under	*59.00-60.00*
Railroad specialties	*45.00-46.00*

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*36.00-37.00*
No. 2 heavy melting	*32.00-33.00*
No. 1 bundles	*36.00-37.00*
No. 2 bundles	*28.00-29.00*
No. 1 busheling	*36.00-37.00*
Machine shop turnings	*20.00-21.00*
Mixed borings, turnings	22.00-23.00
Short shovel turnings	*22.00-23.00*
Cast iron borings	22.00-23.00
Low phos. 18 in.	*47.00-48.00*

Cast Iron Grades

No. 1 cupola	*38.00-39.00*
Heavy breakable cast	*33.00-34.00*
Charging box cast	*33.00-34.00*
Drop broken machinery	*48.00-49.00*

Railroad Scrap

No. 1 R.R. heavy melt.	42.00-43.00
Rails, 18 in. and under	67.00-68.00
Rails, random lengths	57.00-58.00

BIRMINGHAM

No. 1 heavy melting	*36.00-37.00*
No. 2 heavy melting	*32.00-33.00*
No. 1 bundles	*36.00-37.00*
No. 2 bundles	24.00-25.00
No. 1 busheling	*36.00-37.00*
Cast iron borings	25.00-26.00
Short shovel turnings	*29.00-30.00*
Machine shop turnings	*28.00-29.00*
Bar crops and plates	*43.00-44.00*
Structurals & plate	*43.00-44.00*
Electric furnace bundles	43.00-44.00
Electric furnace:	
3 ft and under	41.00-42.00
2 ft and under	42.00-43.00

Cast Iron Grades

No. 1 cupola	*49.00-50.00*
Stove plate	*48.00-49.00*
Unstripped motor blocks	*38.00-39.00*
Charging box cast	27.00-28.00
No. 1 wheels	*39.00-40.00*

Railroad Scrap

No. 1 R.R. heavy melt	*39.00-40.00*
Rails, 18 in. and under	*53.00-54.00*
Rails, rerolling	*59.00-60.00*
Rails, random lengths	47.00-48.00
Angles, splice bars	*49.00-50.00*

SEATTLE

No. 1 heavy melting	38.00
No. 1 bundles	36.00
No. 2 heavy melting	36.00
No. 2 bundles	25.00
Machine shop turnings	27.00†
Mixed borings, turnings	27.00†
Electric furnace No. 1	40.00†

Cast Iron Grades

No. 1 cupola	38.00
Heavy breakable cast	35.00
Unstripped motor blocks	30.50
Stove plate (f.o.b. plant)	28.00

†Nominal

LOS ANGELES

No. 1 heavy melting	*44.00*
No. 2 heavy melting	*42.00*
No. 1 bundles	*43.00*
No. 2 bundles	*34.00*
Machine shop turnings	*31.00*
Shoveling turnings	*30.00*
Cast iron borings	*30.00*
Cut structurals and plate, 1 ft and under	*58.00*

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	*54.00-56.00*

Railroad Scrap

No. 1 R.R. heavy melt	*44.00*

SAN FRANCISCO

No. 1 heavy melting	*39.00*
No. 2 heavy melting	*37.00*
No. 1 bundles	*38.00*
No. 2 bundles	*30.00*
Machine shop turnings	*27.00*
Mixed borings, turnings	*27.00*
Cast iron borings	*27.00*
Heavy turnings	*27.00*
Short shovel turnings	*27.00*
Cut structurals, 3 ft	50.00

Cast Iron Grades

No. 1 cupola	*50.00-52.00*
Charging box cast	45.00
Stove plate	46.00
Heavy breakable cast	40.00
Unstripped motor blocks	40.00
Clean auto cast	*50.00-52.00*
No. 1 wheels	45.00
Drop broken machinery	*50.00-52.00*

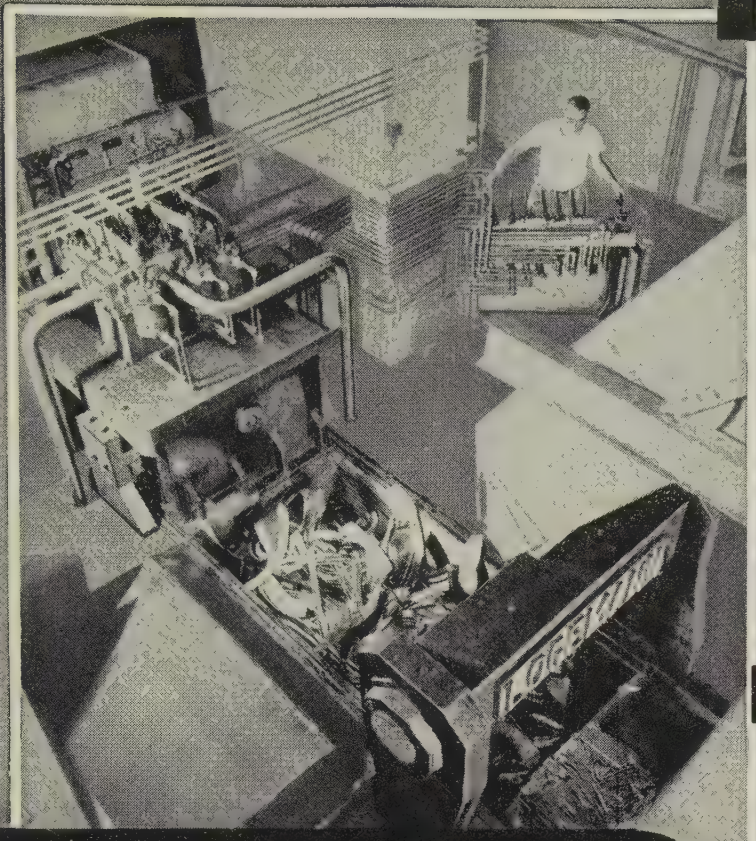
HAMILTON, ONT.

No. 1 heavy melting	*38.00*
No. 2 heavy melting	*33.00*
No. 1 bundles	*38.00*
No. 2 bundles	*28.00*
Mixed steel scrap	*33.00*
Mixed borings, turnings	*21.00*
Busheling, new factory:	
Prepared	*38.00*
Unprepared	*32.00*
Short steel turnings	*23.00*
Rails, rerolling	*47.00*

Cast Iron Grades†

No. 1 machinery cast	50.00

†F.o.b. Hamilton, Ont.



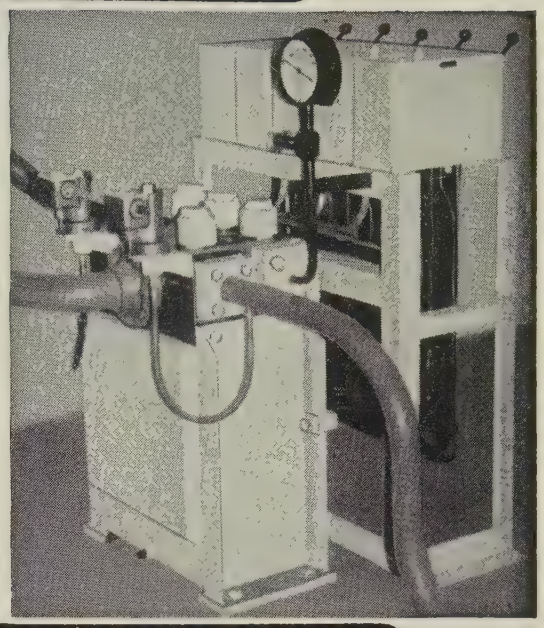
LOGEMANN Metal Balers

. . . powerful . . . compact . . . capable of high tonnage output!

In the large stamping plants and rolling mills where it is critically important that trim and stamping skeletons are quickly disposed of to avoid interference with production, LOGEMANN metal balers are relied on to keep ahead of production and pack such scrap into high density, self-cohering bricks for re-melting.

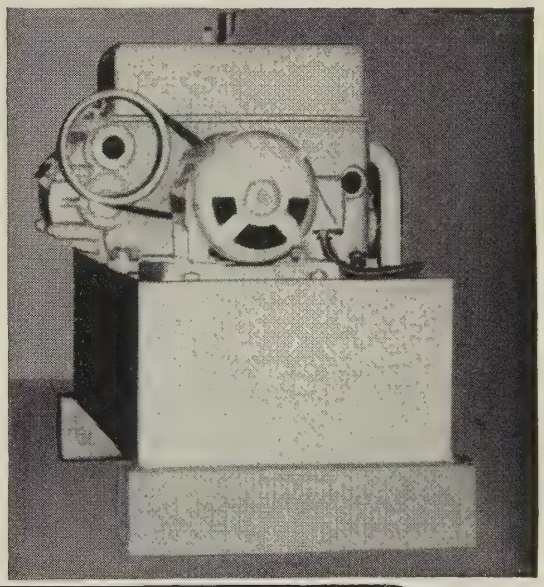
Hundreds of installations have established new records for tonnage, minimum maintenance, reliability, over extended periods of uninterrupted operation at high-speed.

LOGEMANN models are not confined to the large sizes. Many small plants have found it profitable to use smaller sizes embodying the same features of reliability, at minimum operating cost. Interested parties are invited to write for details. Information as to the character of the scrap, tonnage to be handled in a given period of hours, and range of gauges is helpful in determining the proper model.



HYDRAULIC VALVES

The illustration shows a close-coupled hydraulic valve, operated by compressed-air cylinders for high-speed distribution of large gallonage of fluid at high pressure. LOGEMANN engineers have designed and built valves for many unusual as well as standard applications, and will welcome inquiries, with an outline of the conditions and requirements.



HYDRAULIC PUMPS

The opposed-cylinder close-coupled double pressure pump shown in the illustration is mounted on an individual tank to conserve floor space under present crowded plant and operating conditions. When requesting details, please indicate the nature of the service, pressure and gallonage requirements, and the fluid to be handled.

LOGEMANN BROTHERS CO.

3126 W. BURLEIGH STREET • MILWAUKEE 10, WISCONSIN

More Nickel in 1958

U. S. decision to divert stockpile metal to civilian uses will increase availabilty to 245 million lb in 1958. RST switches copper pricing policy. Lead, zinc unchanged

Nonferrous Metal Prices, Pages 206 & 207

MORE NICKEL will be available to civilian consumers in 1958 because the Office of Defense Mobilization has authorized diversion to industry of all nickel scheduled for shipment to the government during the year.

What This Means—ODM will allow 135 million lb of market and premium price nickel normally marked for stockpile to be released next year. Commerce Department estimates that total nickel for nondefense uses in 1958 will hit the 245 million lb figure, an increase of about 18 million lb over 1957.

This will mark the first time that a whole year's delivery of nickel to stockpile has been suspended in one action. This year, the second half was handled in one directive. Before that the government issued its diversion directives quarter by quarter. Since January, the government has issued diversion directives resulting in an extra 117 million lb being placed on the civilian market.

Procedure—Most producers will try to sell the additional supply on the open market under a government sponsored system of distribution. However, a few will sell to the government which in turn will appoint someone to sell it.

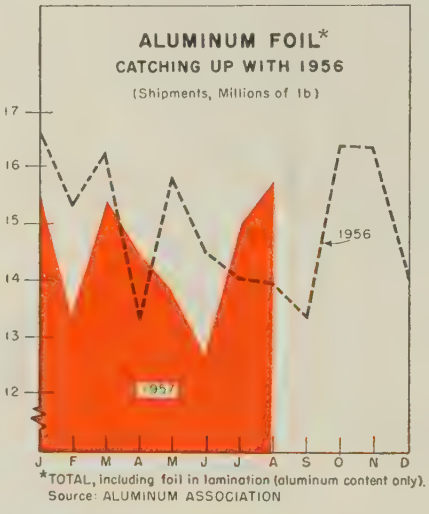
Uncle Sam is committed by contracts to take the diverted metal if producers can't dispose of it. The contracts call for the government to purchase about 50 per cent of the metal at the current market price (74 cents a pound), and the other 50 per cent at a premium price of around $1 a pound.

Demand is not as good as anticipated. Producers may be able to sell all their regular grade, but it's doubtful if all the premium price metal will move.

Outlook—If the industry tries to tender too much metal to the stockpile, it's possible the government may attempt to renegotiate contracts as it did with the aluminum industry.

RST Revamps Pricing

The Rhodesian Selection Trust announced on Oct. 7 that its copper will now be sold at the London Metal Exchange price. Formerly, the RST quoted its own price which sometimes varied as much as 2 cents a pound from the LME. Domestic producers say the move will have no effect on the present U. S. price, but may help to hold down future fluctuations on the LME.



Copper sales haven't improved much lately although the market appears more stable than it did a few weeks ago. Producers report business to wire mills is up some. Brass mills are buying scrap a little more actively.

Customer inventories still remain at low levels. As one metalman put it: "A company calls one day and says it must have delivery the next or production will be held up."

Talk of a new copper tariff continues. Latest entry: Rep. John B. Bennett (R., Mich.) reports he will introduce a bill when Congress convenes in January calling for a tariff of 4 cents a pound when the copper price is 30 cents a pound or lower. (Primary copper is now 27 cents.)

Lead, Zinc Unchanged

Lead and zinc sales continue to hold at fair levels with few signs of improvement.

Shipments of lead to battery manufacturers have improved; lead demand from tetraethyl makers remains good. Orders from the construction industry are still off.

"Dog eat dog," is the way one observer sums up the zinc picture. Competition is fierce because overproduction and slack demand still rule the market. Profit margins are down, and customers reportedly drive hard bargains. There are a few reports of price shading and the elimination of fringe charges by individual producers.

Zinc producers look for stepped up demand from diecasters later in the quarter. But they say gal-

NONFERROUS PRICE RECORD

	Price Oct. 9	Last Change	Previous Price	Sept. Avg	Aug. Avg	Oct., 1956 Avg
Aluminum ..	28.10	Aug. 1, 1957	27.10	27.100	27.100	27.100
Copper	26.00–27.00	Sept. 12, 1957	25.50–27.00	26.469	28.639	38.365
Lead	13.80	June 11, 1957	14.80	13.800	13.800	15.800
Magnesium .	35.25	Aug. 13, 1956	33.75	35.250	35.250	35.250
Nickel	74.00	Dec. 6, 1956	64.50	74.000	74.000	64.500
Tin	92.375	Oct. 9, 1957	92.50	93.422	94.259	105.981
Zinc	10.00	July 1, 1957	10.50	10.000	10.000	13.500

Quotations in cents per pound based on: COPPER, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary ingots, 99 + %, deld.; MAGNESIUM, pig, 99.8%, Velasco, Tex.

vanizing sales are off as much as 25 per cent. Latest statistics show August shipments of galvanized sheets hit 186,790 tons, compared with 167,247 tons in July and 276,048 tons in August, 1956.

Observers see no change in lead and zinc prices until the Tariff Commission takes some kind of action on the industry's request for higher duties. The commission will begin holding hearings on Nov. 19.

More Aluminum Mills

Before World War II, there were only 12 independent fabricators of aluminum turning out such mill products as sheets, foil, and conductor cable. Last year, this figure had jumped to 185 companies, says Harry D. Sedgwick of Aluminium Ltd. Sales Inc., New York, a division of Aluminium Ltd.

In 1956, independent fabricators consumed over 500,000 tons of primary aluminum. Ten years before, only 88,000 tons went to this market. Mr. Sedgwick says his company ships 35 per cent of its primary production to the U. S., most of it to the independents.

Domestic shipments of aluminum sheets and plates dipped to 102,503,000 lb in August from the July figure of 119,226,000 lb, reports the Aluminum Association. Total for the first eight months of 1957 is 886,981,000 lb. Foil shipments were 15,740,841 lb in August, compared with 15,011,369 lb in July (see chart).

Market Memos

- Bridgeport Brass Co. reports first half earnings were $2,854,654 on net sales of $77,532,606, compared with profits of $2,528,008 on net sales of $91,898,033 in the first half of 1956.
- Magnesium castings shipments hit 1272 tons in July, a falloff of 215 tons from June and 133 tons from July, 1956.
- Total production of titanium mill products in July was 897,784 lb, a 277,113 lb drop from the June figure of 1,174,897 lb.
- Domestic mine output of mercury in the second quarter was 8560 flasks, a 29 per cent rise over the first quarter.

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, pigs, 26.00; ingots, 28.10, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 29.90; No. 43, 29.70; No. 195, 31.30; No. 241, 31.50; No. 356, 29.90, 30-lb ingots.

Antimony: R.M.M. brand, 99.5%, 33.00; Lone Star brand, 33.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.50-28.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97%, lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $74.75 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.25% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 97-99%, $2.00 per lb for 550-lb keg; $2.02 per lb for 100-lb case; $2.07 per lb under 100 lb.

Columbium: Powder, $120 per lb, nom.

Copper: Electrolytic, 27.00 deld.; custom smelters, 26.00; lake, 27.00 deld; fire refined, 26.75 deld.

Germanium: First reduction, $179.17-197.31 per lb; intrinsic grade, $197.31-220 per lb, depending on quantity.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $86-110 nom. per troy oz.

Lead: Common, 13.80; chemical, 13.90; corroding, 13.90, St. Louis, New York basis, add 0.20.

Lithium: 98+%, 50-100 lb, cups or ingots $12; rod, $15; shot or wire, $16. 100-500 lb, cups or ingots, $10.50; rod, $14; shot or wire, $15, f.o.b. Minneapolis.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex.; 12 in. sticks, 59.00 f.o.b. Madison, Ill.

Magnesium Alloys: AZ91A (diecasting), 40.75 deld.; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $237-240 per 76-lb flask.

Molybdenum: Unalloyed, turned extrusions, 3.75-5.75 in. round, $9.60 per lb in lots of 2500 lb or more, f.o.b. Detroit.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, 74.50; "F" nickel 5 lb ingots in kegs for addition to cast iron, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01. Nickel oxide sinter, 71.25 per lb of nickel content before 1 cent freight allowance, f.o.b. Copper Cliff, Ont.

Osmium: $80-100 per troy oz, nom.

Palladium: $21-24 per troy oz.

Platinum: $81-87 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $118-125 per troy oz.

Ruthenium: $45-55 per troy oz.

Selenium: $10.50 per lb, commercial grade.

Silver: Open market, 90.625 per troy oz.

Sodium: 16.50, c.l.; 17.00 l.c.l.

Tantalum: Rod, $60 per lb; sheet, $55 per lb.

Tellurium: $1.65-1.85 per lb.

Thallium: $12.50 per lb.

Tin: Straits, N. Y., spot and prompt, 92.375.

Titanium: Sponge, 99.3+%, grade A-1 ductile (0.3% Fe max.), $2.25; grade A-2 (0.5% Fe max.), $2.00 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $3.50 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+% hydrogen reduced, $4.10-4.20.

Zinc: Prime Western, 10.00; brass special, 10.25; intermediate, 10.50, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 11.35; special high grade, 11.75 deld. Die casting alloy ingot No. 3, 14.25; No. 2, 15.25; No. 5, 14.75 deld.

Zirconium: Sponge, commercial grade, $5-10 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 23.75-30.25; No. 12 foundry alloy (No. 2 grade), 21.75-23.00; 5% silicon alloy, 0.60 Cu max., 25.50-26.00; 13 alloy, 0.60 Cu max., 25.50-26.00; 195 alloy, 24.75-26.75; 108 alloy, 22.25-23.00. Steel deoxidizing grades, notch bars, granulated or shot; Grade 1, 23.75; grade 2, 22.00; grade 3, 20.75; grade 4, 19.00.

Brass Ingot: Red brass, No. 115, 27.75; tin bronze, No. 225, 37.00; No. 245, 31.25; high-leaded tin bronze, No. 305, 31.75; No. 1 yellow, No. 405, 22.50; manganese bronze, No. 421, 25.50.

Magnesium Alloy Ingot: AZ63A, 40.75; AZ91B, 37.25; AZ91C, 40.75; AZ92A, 40.75.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.82, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.80, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 30,000-lb lots, 32.355; l.c.l., 32.98. Weatherproof, 30,000-lb lots, 33.66; l.c.l., 34.78. Magnet wire deld., 40.43, before quantity discounts.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $19.50 per cwt; pipe, full coils, $19.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheets and strip, $9.50-15.95; sheared mill plate, $8.00-11.50; wire, $7.50-11.50; forging billets, $6.00-7.60; hot-rolled and forged bars, $6.15-7.90.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 24.00; ribbon zinc in coils, 20.50; plates, 19.00.

ZIRCONIUM

Plate, $12.50-19.20; H.R. strip, $12.50-22.90; C.R. strip, $15.00-31.25; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	126	106	128
Strip, C.R.	124	108	138
Plate, H.R.	120	105	121
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

Sheets: 1100 and 3003 mill finish (30,000 lb base; freight allowed).

Thickness Range Inches	Flat Sheet	Coiled Sheet
0.249-0.136	43.10-47.60	....
0.135-0.096	43.60-48.70	40.50-41.10
0.095-0.077	44.30-50.50	40.60-41.30
0.076-0.061	44.90-52.80	40.80-42.00
0.060-0.048	45.60-55.10	41.40-43.10
0.047-0.038	46.20-57.90	41.90-44.50
0.037-0.030	46.60-62.90	42.30-46.30
0.029-0.024	47.20-54.70	42.60-47.00
0.023-0.019	48.20-58.10	43.70-45.40
0.018-0.017	49.00-55.40	44.30-46.00
0.016-0.015	49.90-56.30	45.10-46.80
0.014	50.90	46.10-47.80
0.013-0.012	52.10	46.80
0.011	53.10	48.00
0.010-0.0095	54.60	49.40
0.009-0.0085	55.90	50.90
0.008-0.0075	57.50	52.10
0.007	59.00	53.60
0.006	60.60	55.00

ALUMINUM (continued)

Plates and Circles: Thickness 0.250-3 in., 24-60 in. width or diam., 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	42.70	47.50
5050-F	43.80	48.60
3004-F	44.80	50.50
5052-F	45.40	51.20
6061-T6	46.90	53.00
2024-T4*	50.60	57.40
7075-T6*	58.40	66.00

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 lb base.

Diam. (in.) or across flats	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
Drawn				
0.125	78.20	75.20	....	....
0.156-0.172	66.20	63.40	....	....
0.188	66.20	63.40	....	81.60
0.219-0.234	63.00	61.50	....	....
0.250-0.281	63.00	61.50	....	77.90
0.313	63.00	61.50	....	74.20
0.344	62.50	....	....	....
Cold-Finished				
0.375-0.547	62.50	61.30	74.80	69.80
0.563-0.688	62.50	61.30	71.10	65.50
0.719-1.000	61.00	59.70	64.90	61.70
1.063	61.00	59.70	....	59.60
1.125-1.500	58.60	57.40	62.80	59.60
Rolled				
1.563	57.00	55.70	....	....
1.625-2.000	56.30	54.90	....	57.50
2.125-2.500	54.80	53.40	....	....
2.563-3.375	53.20	51.70	....	....

Forging Stock: Round, Class 1, 45.20-58.60 in specific lengths, 36-144 in., diam. 0.375-8 in. Rectangles and squares, Class 1, 50.50-66.60 in random lengths, 0.375-4 in. thick, width 0.750-10 in.

Pipe: ASA schedule 40, alloy 6063-T6, standard lengths, plain ends, 90,000-lb base, per 100 ft.

Nom. Pipe Size (in.)		Nom. Pipe Size (in.)	
¾	$19.40	2	$ 59.90
1	30.50	4	165.05
1¼	41.30	6	296.10
1½	49.40	8	445.55

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
9-11	45.40-47.00	60.60-64.80
12-14	45.70-47.20	61.30-65.80
15-17	45.90-47.90	62.50-67.50
18-20	46.50-48.30	64.50-70.10

MAGNESIUM

Sheet and Plate: AZ31B standard grade, 0.32 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.0 in., 67.90. AZ31B spec. grade, .032 in., 171.30; .081 in., 108.70; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Thread plate, .188 in., 71.70; .250-2.00 in., 70.60. Tooling plates, .250-3.0 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	69.60-72.40	84.60-87.40
12-14	70.70-73.00	85.70-88.00
24-26	75.60-76.30	90.60-91.30
36-38	89.20-90.30	104.20-105.30

NONFERROUS SCRAP

DEALER'S BUYING PRICES

(Cents per pound, New York, in ton lots.)

Aluminum: 1100 clippings, 13.50-14.00; old sheets, 10.50-11.00; borings and turnings, 6.50-

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES f		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	49.13b	46.36c	....	49.32	23.000	23.000	22.250
Yellow Brass	43.02	31.30d	43.56	45.93	17.375	17.125	15.750
Low Brass, 80%	45.50	45.44	46.04	48.31	19.500	19.250	18.750
Red Brass, 85%	46.37	46.31	46.91	49.18	20.250	20.000	19.500
Com. Bronze, 90%	47.78	47.72	48.32	50.34	21.000	20.750	20.250
Manganese Bronze	51.01	45.11	55.61	....	16.125	15.875	15.375
Muntz Metal	45.39	41.20	....	....	16.375	16.125	15.625
Naval Brass	47.27	41.58	54.33	50.68	16.125	15.875	15.375
Silicon Bronze	53.76	52.95	53.80	55.74e	22.625	22.375	21.625
Nickel Silver, 10%	59.43	61.75	61.75	....	23.625	23.375	11.813
Phos. Bronze, A-5%	68.07	68.57	68.57	69.75	23.750	23.500	22.500

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb.

7.00; crankcases, 10.50-11.00; industrial castings, 10.50-11.00.

Copper and Brass: No. 1 heavy copper and wire, 18.50-19.00; No. 2 heavy copper and wire, 17.00-17.50; light copper, 15.00-15.50; No. 1 composition red brass, 16.00-16.50; No. 1 composition turnings, 15.50-16.00; new brass clippings, 13.50-14.00; light brass, 9.50-10.00; heavy yellow brass, 11.50-12.00; new brass rod ends, 12.50-13.00; auto radiators, unsweated, 12.00-12.50; cocks and faucets, 12.50-13.00; brass pipe, 13.00-13.50.

Lead: Heavy 9.50-10.00; battery plates, 4.25-4.50, linotype and stereotype, 11.50-12.00; electrotype, 10.00-10.50; mixed babbitt, 11.00-11.50.

Monel: Clippings, 35.00-37.00; old sheets, 33.00-35.00; turnings, 24.00-25.00; rods, 35.00-37.00.

Nickel: Sheets and clips, 50.00-55.00; rolled anodes, 50.00-55.00; turnings, 45.00-50.00; rod ends, 50.00-55.00.

Zinc: Old zinc, 3.00-3.25; new diecast scrap, 2.75-3.00; old diecast scrap, 1.50-1.75.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 1100 clippings, 16.50-17.50; 3003 clippings, 16.50-17.50; 6151 clippings, 16.00-17.50; 5052 clippings, 16.00-17.00; 2014 clippings, 15.50-17.00; 2017 clippings, 15.50-17.00; 2024 clippings, 15.50-17.00; mixed clippings, 15.00-16.00; old sheets, 13.00-13.50; old cast, 13.00-13.50; clean old cable (free of steel), 16.00-16.50; borings and turnings, 13.50-15.00.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 53.00; light scrap, 48.00; turnings and borings, 33.00.

Copper and Brass: No. 1 heavy copper and wire, 21.50; No. 2 heavy copper and wire, 20.00; light copper, 17.75; refinery brass (60% copper) per dry copper content, 19.25.

INGOTMAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

Copper and Brass: No. 1 heavy copper and wire, 21.50; No. 2 heavy copper and wire, 20.00; light copper, 17.75; No. 1 composition borings, 19.00; No. 1 composition solids, 19.50; heavy yellow brass solids, 13.50; yellow brass turnings, 12.50; radiators, 15.50.

PLATING MATERIALS

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.70 per lb.

Copper: Flat-rolled, 45.29; oval, 43.50, 5000-10,000 lb; electrodeposited, 35.75, 2000-5000 lb lots; cast, 36.25, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 110.50; 200-499 lb, 109.00; 500-999 lb, 108.50; 1000 lb or more, 108.00.

Zinc: Balls, 17.50; flat tops, 17.50; flats, 19.25; ovals, 18.50, ton lots.

CHEMICALS

Cadmium Oxide: $1.70 per lb in 100-lb drums.

Chromic Acid: 100 lb, 33.30; 500 lb, 32.80; 2000 lb, 32.15; 5000 lb, 31.80; 10,000 lb, 31.30, f.o.b. Detroit.

Copper Cyanide: 100-200 lb, 74.80; 300-900 lb, 72.80.

Copper Sulphate: 100-1900 lb, 14.55; 2000-5900 lb, 12.55; 6000-11,900 lb, 12.30; 12,000-22,900 lb, 12.05; 23,000 lb or more, 11.55.

Nickel Chloride: Less than 400 lb, 35.00; 400-9990 lb, 33.00; 10,000 lb, 32.50.

Nickel Sulphate: 5000-22,000 lb, 33.50; 23,000-35,900 lb, 33.00; 36,000 lb or more, 32.50.

Sodium Cyanide: 100 lb, 27.60; 200 lb, 25.90; 400 lb, 22.90; 1000 lb, 21.90; f.o.b. Detroit.

Sodium Stannate: Less than 100 lb, 74.30; 100-600 lb, 65.20; 700-1900 lb, 62.50; 2000-9900 lb, 60.60; 10,000 lb or more, 59.30.

Stannous Chloride (anhydrous): Less than 25 lb, 163.50; 25 lb, 128.50; 100 lb, 113.50; 400 lb, 110.00; 5200-19,600 lb, 98.80; 20,000 lb or more, 86.60.

Stannous Sulphate: Less than 50 lb, 126.40; 50 lb, 96.40; 100-1900 lb, 94.40; 2000 lb or more, 92.40.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page* 201)

continues weak. Some dealers anticipate further price reductions. Cast scrap is relatively firm.

St. Louis—The decline in scrap continues, but the pace is slower. Mills hold ground stocks averaging 75 to 90 days. They are withholding new orders. Industrial material is flowing to market in moderate volume here, but large quantities in the Chicago area are reducing demand for country scrap there, leaving this area with an excess of rural metal.

Birmingham—Scrap prices continue to decline here. The cast grades have joined in the slide, after bucking the trend for nearly a month. All open hearth customers are out of the market, and electric furnace operators are buying sparingly.

Los Angeles — Scrap prices are lower here. Domestic demand is lacking and buying for export is absent. As a result, prices on most grades are off an average of $2.

San Francisco—Prices are down $3 to $5 a ton on the steel grades. Quotations have declined 20 per cent over the last three months, and immediate prospects are for continued decline.

Seattle—Despite a price decline of $4 a ton the week preceding, the scrap market continues weak. There is little trading, and consumer interest is absent.

Making Vacuum Castings

Large commercial castings made by a vacuum casting process are being produced at U. S. Steel Corp.'s Duquesne Works, Duquesne, Pa. This method extracts harmful gases from molten metal prior to formation of the ingot. This in turn increases ductility in forgings, and removes their sensitivity to internal ruptures. (For more details on vacuum casting see STEEL, July 22, p. 140.)

In addition to servicing the needs of electric power equipment builders, this new process will be used for other high grade steel products where trapped gases may have detrimental effects on finished forgings. Examples: Large bearings for the shipbuilding industry and various parts for high speed aircraft.

CLASSIFIED

Help Wanted

CLEANING ROOM SUPERINTENDENT: Must have supervisory experience and be completely familiar with all phases of cleaning room operations for a miscellaneous steel jobbing foundry producing castings up to 10,000 pounds. Excellent opportunity for an aggressive qualified man with a modern and progressive foundry located in the Middle West producing 600-700 tons per month. Advise full particulars including salary requirements. Box 603, STEEL, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

MECHANICAL ENGINEER, 43, graduate, 20 yrs. experience plant engineering, forward planning, design, specifications, new construction in seamless and welded tube mills and related plant facilities. Desires to relocate as dept. head or administrative assistant. Midwest or far west preferred. Appropriate responses acknowledged. Reply Box 602, STEEL, Penton Bldg., Cleveland 13, Ohio.

Advertising Index